
To: Paul Baker
Utah Division of Oil, Gas and Mining
File: M/0047/0090

From: Linda Matthews
Date: February 3, 2015

Reference: U.S. Oil Sands (USOS) PR Spring Mine Response to Initial Review – List of Pages

The following pages are enclosed:

- 1) USOS Transmittal Letter
- 2) USOS Response to Initial Review of Revised Notice of Intention to Commence Large Mining Operations
- 3) Notice text Page i; Notice pages 3, 6-7, 10-22, 24-25, 27-32, 37-44, 46-48, 51
- 4) Figures 1, 2, 3, 3a, 4a-d, 5, 6a-b, 7, 8, 11
- 5) Appendix E - Year One Reclamation Surety Estimate Sheets
- 6) Appendix G – Erosion Control Typical Drawings

STANTEC CONSULTING SERVICES INC.

Linda Matthews
Project Manager, Environmental Science
Phone: (801) 943-4144 x 1113
Fax: (801) 942-1852
linda.matthews@stantec.com

Attachment: Pages as listed above

February 3, 2015

Mr. Paul Baker
State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Re: **M/047/0090 - U.S. Oil Sands, Inc., PR Spring Mine – Response to Initial Review of Revised Notice of Intention (NOI) to Commence Large Mining Operations**

Dear Mr. Baker:

U.S. Oil Sands, Inc. has completed our response to the Division's comment letter dated January 21, 2015. The response has been formatted to address each comment within the Initial Review comment table provided by the Division. Revised figures and NOI text replacement pages are enclosed. The revised NOI text pages are provided in track changes.

Feel free to contact me if you have any questions on this information. As always, we appreciate your help with this permitting process.

Sincerely,



Doug Thornton, HSE & Regulatory Manager

Enclosures

cc: Linda Matthews, Stantec

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Suite #1600, 521 – 3rd Avenue SW, Calgary, AB, T2P 3T3 CANADA Office 403-233-9366 Fax 587-353-5373

**Response to INITIAL REVIEW OF NOTICE OF INTENTION
TO COMMENCE LARGE MINING OPERATIONS**

**U.S. Oil Sands
PR Spring Mine**

M/047/0090

Comments dated January 21, 2015

Responses dated February 3, 2015

General Comments:

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
1	General	Submittal should be formatted to easily incorporate additional revisions and amendments. (No response needed.)		
2	General	The Division may generate additional comments based on the response to this review. (No response needed.)		
3	General	The Division recommends use of the term “operator” instead of “USOS” throughout the Notice. The suggested change has been made starting in Section 104.2 and throughout the remainder of the Notice.	lah	

R647-4-105 - Maps, Drawings & Photographs

General Map Comments

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
4	All Maps	Please show “Phase 1” outline (as is referred to in the text) on all maps. Is Phase 1 the same as the disturbance boundary on the maps? This applies to Figures 1, 2, 4a-d, and 5. Yes, the outline represents Phase 1 disturbance. The legends of the noted figures have been revised to add ‘Phase 1’.	lah	
5	All X-sections	On Figures 6a, 6b and 6c, please reduce the vertical exaggeration. The current depiction of exaggerated cross section profiles gives the impression of steep terrain and may be misunderstood by the public. The cross sections have been amended slightly to reduce vertical exaggeration. Some vertical exaggeration is required to differentiate the oil sand beds. The revised cross sections are shown on Figures 6a and 6b.	lah and aa	

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
6	All X-sections	On Figures 6a, 6b and 6c, please label the slope angles on both the cut and the fill slopes to be consistent with the text. The rock slopes discussed on page 10 commit to 1H:1V slope, so please label x-sections as “max 1H:1V”. Fill slopes noted on page 15 to be no steeper than 3H:1V, so please label x-sections as “max 3H:1V”. <i>On Figures 6a and 6b, the slope angles have been labeled as suggested.</i>	lah	
7	Omission	Please add a figure or plan sheet of “typical BMP’s” for erosion control. The BMP design drawings from the original Notice were omitted for this submission. The Division would like to have the BMP erosion control structures resubmitted so these structures match the ones that will be used onsite. <i>BMP drawings are being provided in Appendix G. Also see comment #12</i>	lah aa	

105.1 - Topographic base map, boundaries, pre-act disturbance

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
8	Figure 2	The premining map shows the location of the soil stockpile in the same location as it is shown on Figure 4D at the end of year 4. Please make the appropriate correction. <i>The soil stockpile has been removed from Figure 2.</i>	aa	
9	Figure 2	The topsoil stockpile and stormwater management area colors on the map legend are too similar and should be changed so they can be better distinguished. <i>The colors on Figure 2 have been changed to address the comment.</i>	aa	

105.2 - Surface facilities map

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
10	Omission	Include areas that will be lined and label areas where secondary containment is needed. Please also include labels on the figures of clay lined or HDPE liners. Figure 3a has been added. Please see response to Comment #19.	lah	

105.3 - Drawings or Cross Sections (slopes, roads, pads, etc.)

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
11	Figure 4d	Please include reclamation maps up through the end of year 6, since that is what the text states will be the completion time for the Phase I activities. The Phase 1 activities extend through year 5, as noted in the Notice text. Year 6 has been removed from Table 2. The reclamation map is Figure 11.	aa	
12	Figure 7	Please be more specific about which sediment control features will be used at the bottom of the pit slopes instead of labeling the areas SED BMP. Sediment control features including straw wattles, erosion control matting, and rip/rap have been added to Figure 7.	aa	
13	Figure 8	Please put a strike and dip symbol on the map which is consistent with the text. Use USGS standards, i.e. add to legend, use stand symbol, and place symbol at the outcrop location. The strike and dip symbol has been added to Figure 8.	lah	
14	Figure 11	The legend shows the man camp in the same color disturbance area on the inset map. The man camp should be labeled as being off the map and include an arrow with a note showing the distance. The suggested changes have been made on Figure 11.	lah	
15	Figure 11	Please include the placement of interim reclamation erosion control features on this map (see comment 38). Figure 7 indicates interim reclamation erosion control features to be used as disturbance progresses through the mine plan. Figure 11 shows final reclamation contours at end of year 5 and reclamation treatments. All erosion control BMPs will be utilized during concurrent reclamation as well as the time from seeding up through the time when vegetation is successful.	aa	

R647-4-106 - Operation Plan

106.2 - Type of operations conducted, mining method, processing etc.

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
16	Page 10 para 2	<p>Subgrade ore: a) Show locations of temporary stockpile on the maps, and b) Restate “suppress dust on roads or other areas.” (See page 14, para 1 from June 9, 2014, approval.) The size of the subgrade ore stockpiles should be relative to Table 3. This also applies to paragraph 4 on page 11.</p> <p>Subgrade ore should not be mixed with water and used for dust suppression on the roads or other areas. This creates an unnecessary risk of petroleum hydrocarbon laden-water as runoff that could enter drainages in the surrounding area.</p> <p>a) The approximate location and size of a temporary subgrade ore (reject) stockpile has been added to Figure 3. b) The text has been revised.</p> <p>Subgrade ore as indicated in Table 3 is merely the estimated volumes that will be placed directly back into the OIS storage areas or pit backfill with overburden and interburden material. It is not anticipated that subgrade ore will be stockpiled. At the stockpile reclaim hopper, “reject” material, which may include some subgrade ore, may be stockpiled and returned to the OIS areas and pit backfill. The estimated reject stockpile volume should be relatively small as the material will often be hauled back to the OIS and pit backfills. This temporary (reject) stockpile will now be indicated on Figure 3.</p> <p>Subgrade ore will not be mixed with water and sprayed on the roads or other areas for dust suppression. However, it is anticipated that subgrade ore (similar in consistency to ordinary asphalt pavement) may be used to pave portions of the processing plant and/or haul roads for dust suppression. Upon final reclamation, this material will be placed back in OIS areas or pit backfill. The text has been revised to indicate this.</p>	lah aa	
17	Page 10 & App D	<p>The blast rig needs to be included in the reclamation cost estimate.</p> <p>When blasting is required, a certified blasting contractor will be used to store and handle explosives as well as facilitating the blast. The explosives and blast rig(s) would be supplied by the contractor and located onsite as needed. The contractor will remove the explosives and blast rig(s) once blasting is complete and no longer needed. No cost estimate is needed. The Notice text has been modified to reflect the above information.</p>	lah	

Response to Initial Review

Page 5 of 11

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February 3, 2015

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
18	Page 10 para 6; page 15	<p>The text refers to a 2013 report by Seegmiller, but the report has not been included in the Notice. The Division suggests removing reference to the report as slopes less than 1H:1V do not require a geomechanical or geotechnical report. The Division prefers reference to a factor of safety that will be maintained.</p> <p>The references to the Seegmiller report have been deleted. The text has been revised to include maintenance of an adequate factor of safety as well as the following text: "Geotechnical studies for this project estimates a FOS of 2.98 for pseudo static (earth quake conditions) and 3.70 for static (non-earthquake condition) for the pit high walls."</p>	lah	
19	Page 12	<p>Please show on a figure, such as 3a, the areas of secondary containment liners for all areas discussed on page 12.</p> <p>Figure 3a has been added showing lined and secondarily contained areas. All hydrocarbon storage containment areas will be designed, built and monitored according to SPCC regulations. The specifics of the SPCC plan will be provided in Appendix F as the plant becomes operational and according to 40CFR112 requirements.</p>	lah	
20	Pg. 13 106.2	<p>The plan indicates that the solvent will be recycled and returned to the front of the process. Is there any solvent and/or process water that eventually cannot be recycled any further and will require storage for off-site disposal?</p> <p>No, all solvent and process water will be continually recycled through the process. No storage or off-site disposal will be needed.</p>	aa	
21	Page 14 Para 6	<p>Please provide the pipeline diameter in the text, show on the reclamation map where the pipeline will be capped during final reclamation, and include in the reclamation cost estimate.</p> <p>From the westernmost well (PW-1) to the easternmost well (USO-5), the pipe is 4" OD, and from the easternmost well (USO-5) to the plant, the pipe is 6" OD. This is now reflected in the text. The waterline will be capped at the wellheads and at the point it connects to the plant. The latter connection will be capped underground; the approximate location has been added to Figure 11. These reclamation activities are included in the reclamation cost estimate provided as part of this response to comments.</p>	lah	

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
22	Page 16 Para 2	More information is needed on the assumptions of pore water pressure increases, as the plan indicates the backfill will be blended with overburden and interburden. The text related to pore water pressure increases has been revised.	lah	
23	Page 16 Para 2; Page 15 Para 4	The Notice refers to “straw waddles or similar BMP.” The Division suggests that this be rewritten as, “the appropriate erosion BMP, as defined under the impacts section of the Notice.” The Division generally prefers stone check dams over straw waddles, but each has their appropriate application. Please include a drawing or plan sheet with the BMPs that could be used at the site. The text has been revised as follows: “Appropriate BMPs may be used to prevent transport of any sediment or eroded material off the site.” Also, please refer to BMP drawings supplied in response to Comment #7.	lah	
24	Page 17 Table 1	In the row labeled “topsoil storage area on pit”, please add parentheses around 3.8 to show that it is a negative number. The parentheses have been added as requested.	lah	

106.3 - Estimated acreages disturbed, reclaimed, annually

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
25	Page 18 Table 2	Table notes only nine acres at year six. Please specify in the text what acreage will be remaining at year six. The ‘year six’ line has been removed from the table to accurately reflect the 5-year operation as described in text.	lah	

106.4 - Nature of materials mined, waste and estimated tonnages

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n

Response to Initial Review

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February 3, 2015

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
26	Page 18 Para 3	Please rewrite the phrase "... overlain by Green River Formation . . ." as the formation below is also the Green River formation. The text has been adjusted accordingly; an additional statement has been added. Clarifications have been provided in the notes, Table 3.	lah	

106.6 - Plan for protecting & re-depositing soils

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
27	Pg. 22	The text contains the statement "...salvaged vegetation will be placed adjacent to or beneath the salvaged soil". As far as possible, vegetation should not be buried under the soil pile but placed on the surface of the pile to promote growth and future live hauling of vegetation for reclamation. The text has been adjusted accordingly.	aa	

106.8 - Depth to groundwater, extent of overburden, geology

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
28	Page 25 para 3	Include a brief discussion on the stratigraphy below the lowest mining points. A brief discussion on stratigraphy has been added.	lah	

R647-4-109 - Impact Assessment

109.1 - Impacts to surface & groundwater systems

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
29	Pg. 28	<p>The narrative notes that no springs or seeps were identified within the Phase 1 project area during a May 2014 reconnaissance with personnel from the Division, Water Quality, and the Utah Geological Survey. While this is true, the field reconnaissance did identify springs and seeps flowing within Long Shot Canyon (T16S R23E, Sec. 6), which is part of the Main Canyon watershed. The U.S. Geological Survey has mapped these springs, along with several others within the Main Canyon watershed. Access restrictions prevented the group from conducting a more detailed survey of the other mapped seeps and springs within the watershed. Because the Phase 1 mining area is part of the Main Canyon watershed, it is necessary to evaluate any impacts from the mining operation, which is why a baseline characterization of the springs and seeps is needed. Please include a baseline characterization spring and seep survey to begin in the spring of 2015.</p> <p>Figure 9 indicates the USGS mapped seeps and springs within the Main Canyon watershed. We see no need to perform additional surveys on seeps and springs that are in opposite canyons and hydro-geologically disconnected from surface and/or ground water flow within the Phase 1 disturbance area. Baseline information on these seeps and springs will not provide data relevant to assessing the impacts of the project on surface and/or ground water.</p>	aa	
30	Pg. 30	<p>The water right allotment for the two production wells is 360 acre feet/annually. The source of this water is from the deep Douglas Creek regional aquifer that is located approximately 2,000 below the surface. The Notice does not address what volumes of water are needed to process the bitumen. For the Division to determine that U.S. Oil Sands is not exceeding their allotment of water from water right number 41-3523, please update the narrative and quantify the amount of water used for processing on both a daily and annual basis.</p> <p>Given a continuously running plant at 90% availability, we estimate the daily usage at approximately 168,480 gallons/day and 61.5 million gallons/year (189 acre-feet). This estimate of water usage has been added to the Notice.</p>	aa	

109.4 - Slope stability, erosion control, air quality, safety

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
31	Page 37 Para 4	This section of the plan use the slope notation 1:1. Elsewhere it is properly noted as 1H:1V. Please change to 1H:1V for consistency. The notation has been changed to be consistent.	lah	
32	Page 37 Para 4	Please see comment 16 above. Please see comment 16 response.	lah	
33	Page 38 Para 2	Please see comment 24 above. If the reference is to comment 23, the text has been revised accordingly.		

R647-4-110 - Reclamation Plan

110.2 - Roads, highwalls, slopes, drainages, pits, etc., reclaimed

Com ment #	Sheet/Page/ Map/Table #	Comments	Initia ls	Revie w Actio n
34	Page 42 all	Please define “deep-ripped”. The Division prefers that the Notice specify a ripping depth. The following text has been added to the Notice: “Except where bedrock is encountered, ripping will be a minimum of 24 inches deep, with ripper shanks spaced no more than 24 inches apart. In shallow bedrock areas, ripping depth may be less than 24 inches by necessity.”	lah	
35	Page 43 Para 5	The Division agrees with the transfer of a viable water well, but until such time a transferee is found in the future, the well and the pipeline will need to be included in the reclamation cost estimate. Please add to the cost estimate and include a brief narrative to the text. The capping of water pipelines is reflected in the reclamation cost estimate. The following text has been added to the Notice: “For reclamation purposes under this plan, the operator will cap the water pipelines at the wellheads and underground at the point of connection to the plant. The pipelines will be abandoned in place.”	lah	

List of Tables

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<u>Figure 3a</u>	<u>Site Secondary Containment</u>
Figure 4 (a-d)	Surface Facilities
Figure 5	Ore Removal Sequence
Figure 6 (a- b e)	Mine Cross Sections
Figure 7	Mine Site Storm Water Management
Figure 8	Geology Map
Figure 9	Water Features
Figure 10	Vegetation Map
Figure 11	Reclamation Plan

Appendices

Appendix A	Site Exploration & Summary of Lands under Lease
Appendix B	Correspondence
Appendix C	Soils Descriptions & Vegetation Data
Appendix D	Equipment List & Plant Flow Sheet
Appendix E	Surety Calculation (<i>placeholder</i>)
Appendix F	SPCC Plan (<i>placeholder</i>)
Appendix G	Storm Water Management Plan (<i>placeholder</i>)
Appendix H	Site Photographs

104.2. Surface and Mineral Owners of All Lands to be Affected

OWNERSHIP OF THE LAND SURFACE: SITLA.

OWNERS OF RECORD OF THE MINERALS TO BE MINED: SITLA

| USOS (the operator) owns lease rights to mine oil sands up to 500-feet below ground surface under SITLA Leases summarized in Appendix A. There are no BLM lease or project file numbers associated with this LMO.

ADJACENT LAND OWNERS:

Red Rock Gathering Company , LLC – Natural Gas Pipeline Right of Way
c/o Summit Midstream Partners
2100 McKinney Avenue, Suite 1250, Dallas, TX 75201

Uintah County - Road 2810 Right of Way
147 East Main St.
Vernal, UT 84078

Bureau of Land Management, Vernal Field Office
170 South 500 East
Vernal, UT 84078

Township 15 South, Range 23 East, SLB&M

Section 26:

Grazing Permit 20905: Lazy 3X Cattle, LLC
561 South Road
Mack, CO 81525

Mineral Lease 49944: National Fuel Corporation
8400 E Prentice Avenue, Suite 735
Greenwood Village, CO 80111

Mineral Materials Permit 52715:
Blue Mountain Crushing, LLC
1859 Connor Street
Salt Lake City, UT 84108

Section 27:

Grazing Permit 20905: Lazy 3X Cattle, LLC
561 South Road
Mack, CO 81525

Grazing Permit 23237: Lazy 3X Cattle, LLC
561 South Road

Township 15.5 South, Range 24 East, SLB&M

Section 31:

Grazing Permit 20905: Lazy 3X Cattle, LLC
561 South Road
Mack, CO 81525

Grazing Permit 21202: Burt De Lambert
PO Box 607
Vernal, UT 84078-0607

Range Improvement 433: Clay McKeachnie
PO Box 1894
Vernal, UT 84078

Section 32:

Grazing Permit 20905: Lazy 3X Cattle, LLC
561 South Road
Mack, CO 81525

Mineral Lease 49572: Moose Mountain Land Company
4571 South Holladay Boulevard
PO Box 17397
Salt Lake City, UT 84117

The adjacent surface and mineral owners (BLM and SITLA) have been notified regarding prior DOGM approvals for earlier site work. They will be notified again in writing once this NOI revision is tentatively approved (those agencies are both currently aware of the project), and those agencies will notify other land users or right-of-way holders as they deem appropriate.

Under the terms and conditions of the leasing agreement(s) of SITLA leases, the operator ~~USOS~~ has the legal right to enter and conduct mining operations on the land covered by this notice.

104.3. Federal Mining Claims or Lease Numbers

There are no Federal mining claims or permits associated with this NOI.

R647-4-105. Maps, Drawings and Photographs

105.1. USGS topographic base maps, as well as other select figures in the NOI (Figures 1-11) provide the following information:

- 1.11 Property boundaries of surface ownership.
- 1.12 Water features (including streams and springs), infrastructure, and surface/subsurface facilities within 500 feet of mining operations.
- 1.13 Access routes.
- 1.14 Previous mining/exploration impact in the disturbance area is shown on photographs in Appendix H.

105.2. Surface facilities maps (Figures 1-6) include the following information:

- 2.11 Surface facilities
- 2.12 Disturbance boundary

105.3. Other maps that may be required:

- 3.11 There would be no re-graded slopes to be left steeper than 2H:1V
- 3.12 The road and production well pads to be left as part of post-mining land use are described below under 3.14.
- 3.13 There would be no water impounding structures >20 feet high.
- 3.14 The areas that will be left un-reclaimed as part of the post-mining land use isare the production water wells s-and access road shown on Figure 2, excepting that portion of the access road shown as reclaimed on Figure 11.
- 3.15 There will be no diversion channels constructed.
- 3.16 Geology, oil sands cross sections, water features and vegetation communities are shown on **Figures 8, 9, and 10**, respectively.
- 3.17 Reclamation treatments are shown on **Figure 11**.
- 3.18 Mine plan cross sections are provided as Figures **6a-be**.

105.4. Site photographs are included as Appendix H.

105.5. No underground development will occur: Surface mine development is shown on **Figures 2 and 4a-d**.

targeted oil sand beds have been mined in a given cut area, backfilling will commence in the respective cut area (**Figures 4a-d**).

Some of the oil sand ore will have bitumen concentrations below the economic cutoff grade (subgrade ore). This determination will generally be made at the pit, and subgrade ore will be hauled directly to either the OIS or backfill areas. In some instances, subgrade ore may be rejected at the ore stockpile area and stockpile reclaim hopper; in these cases, it would be stockpiled temporarily with other 'reject' materials for eventual hauling back to OIS or backfill areas. Subgrade ore (similar in consistency to ordinary asphalt pavement) may be used to pave portions of the processing plant area and/or haul roads for dust suppression. Upon final reclamation, this material will be placed back in OIS areas or pit backfill. or it would be used to suppress dust on roads or other areas.

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Overburden and/or interburden may be sufficiently friable to allow removal by dozers, without the need for blasting. However, where blasting is required to facilitate material removal, shot patterns and delays will be designed with adequate stemming to minimize fly-rock, vibration and dust, while generating aggregate size material conducive to removal from the mine area. Blast hole size, spacing and depths, as well as the frequency of blasting, will vary depending upon the situation, but in all cases will be in accordance with local, state and federal rules. Blasting should not result in fly rock landing on the adjacent county road. However, as a precaution, the county road will be temporarily barricaded at the north and south ends for the duration of the blast and post-blast inspection. In addition, all access roads to the blast area will be blocked and posted with warning signs. All loading, blasting and explosives handling will follow Mine Safety and Health Administration (MSHA) safety and security regulations and guidelines as well as other relevant federal regulations. When blasting is required, a certified blasting contractor will be used to store and handle explosives as well as facilitating the blast. The explosives and blast rig(s) would be supplied by the contractor and located onsite as needed. The contractor will remove the explosives and blast rig(s) once blasting is complete and no longer needed. No reclamation cost component is required.

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Regular and routine inspections will occur throughout the mine area. This will ensure operating conditions remain safe and in compliance with MSHA regulations. It will also ensure the mining plan stated herein is being followed.

Pit Design

Phase 1 mining will begin in Pit 1, and progress sequentially through Pit 2 and Pit 3.

Pit highwalls are designed to have an overall slope of 1H:1V which has been determined to be geotechnically stable. Use of 1H:1V pit slopes is supported by technical studies (Seegmiller 2013) including rock mechanics tests on representative core samples from planned highwalls. Geotechnical studies for this

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project estimate a factor of safety of 2.98 for pseudo static (earthquake conditions) and 3.70 for static (non-earthquake condition) for the pit high walls. The factor of safety will be reviewed and conditions adjusted as needed while mining progresses and environmental conditions change. An adequate factor of safety will be maintained. Stability analyses to evaluate proposed highwalls and bench slope angles state that "highwalls and benches should be stable using the planned slope profile for up to 150 feet maximum overall slope height".

Format

Site-specific information indicates that steeper slopes could be justified: numerous existing road cuts and excavations in the area (including the operator USOS's 2005 production test pit) are stable with slopes steeper than 1H:1V. Any required blasting along highwalls will be accomplished with controlled blasts to eliminate over-break and weakening of the remaining material on the face of the slope.

Pit sequencing is designed to reduce the area outside of pit footprints where OIS storage areas will be needed. The pit design allows for direct backfilling to a nearby mined out area as early in Phase 1 as feasible. It also enables pit backfilling to be done at near-final topography, which reduces re-handling and facilitates concurrent reclamation.

Hauling

Initially, overburden and interburden removed from Pit 1 will be hauled from the active pit area to an OIS storage area. Once there is a sufficient mined out area in Pit 1, overburden and interburden will be hauled and placed directly as pit backfill. Placement is described further below in the pit backfill and OIS storage area subsections.

Mined oil sands will be hauled to the plant site (**Figure 3**) and discharged to a scraper/truck underflow dump conveyance system. From the scraper/truck dump, oil sand ore is distributed via a conveyor to the radial stacker into one of two plant feed stockpiles. Loaders will tram the oil sand ore from these stockpiles and feed the hopper where the ore starts into the plant through the front end ore conditioning screener/crusher. Oil sand ore can also be stored in the auxiliary storage area of the plant site in the event the plant feed stockpiles are at capacity. Generally, a two-week supply of ore will be maintained in the plant feed stockpiles at the plant site.

Oil sand ore determined at the pit to be subgrade ore will be hauled directly to either the OIS or pit backfill areas. Some subgrade ore (similar in consistency to ordinary asphalt pavement) ~~may~~will be used to pave portions of the processing plant ~~and/or area and cover~~ haul roads for dust suppression.

Once separated from the bitumen, solids will be hauled from the plant site back to an OIS storage area or to a mined out pit and placed as backfill. Solids handling details are given below in the pit backfill and OIS storage area subsections.

PROCESSING

General Facility Description

▲ The plant site will be located adjacent to Uintah County Road 2810 (Seep Ridge Road) in the area shown on **Figure 3**. As shown on this plant site diagram, the major features will include:

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- an administrative building complex with an attached lab and associated parking area;
- a mine operation maintenance shop warehouse;
- equipment warehouse;
- an electrical generation area;
- equipment staging and auxiliary storage area;
- the process plant, with associated process water tanks, de-watering equipment, etc.;
- a tank farm and tank truck loading area;
- a lined process sump;
- a storm water retention pond; and
- stockpiles for solids, reject materials (materials that contain too much interburden or overburden to be viable for processing), and ore.

Each unit or module of the plant will have a collection sump with an associated pump to pump any upset of fluids to a centralized lined sump. The unit or module sump pumps will also have the ability to pump any upset of fluids directly back into the appropriate unit or module. The centralized lined sump is designed to contain 2.0 times the combined volume of the primary separation vessels (PSV #1 and PSV #2), which is approximately 70,000 gallons not including freeboard. Any fluids collected in the sump system will be promptly returned to appropriate units or modules in the plant system.

Sized secondary containment for the hydrocarbon tanks (bitumen and the extraction solvent) will be sized to comply with the current Spill Prevention Control and Countermeasure Plan requirements (40CFR112).

The secondary containment (**Figure 3a**) will be sized to contain the volume of the largest single container and sufficient freeboard to contain precipitation. Tanks, whose material and conditions of storage are compatible with the material stored, will be erected on compacted gravel bases with a liner also compatible with the hydrocarbons being stored. Liners will be integrated with the secondary containment berms.

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Non-hydrocarbon liquids, including process water, will be managed to prevent release. The clarifier, and process water tanks will be located next to the process plant within a secondary containment structure. Process water will consist of approximately 96% recycled water and 4% make-up water; due to the percentage of recycled water, the process water would contain minimal amounts of solvent and remnant hydrocarbons from prior use in the plant.

The remainder of the plant site is constructed to be internally draining, wherein precipitation incident to the plant site, with the exception of that falling within the tank farm and non-hydrocarbon liquids containment areas, is directed to and collected at the storm water retention pond. The pond will be located at the low point of the plant site (See **Figure 3** for pond location) and will collect only runoff generated from precipitation falling upon the plant site itself. No process water will be routed to this pond, but water may be pumped out of it via a sump pump for use back in the plant. Sediments collected in the

pond will be removed as needed in order to maintain its design capacity. The total depth (not including freeboard) will be approximately seven feet. Berms and ditches directing runoff to the storm water retention pond are shown on **Figures 3**. Standard engineering practices are used to determine specifications that provide for structure integrity and off-site protection. More details are provided in various other sections of this NOI as well as the Storm Water Management Plan (SWMP) located in **Appendix G**.

The administrative building and small lab are modular buildings designed to be set on gravel pads. The parking areas will be graveled. The process equipment will sit on skids within secondary containment. The mine operations maintenance shop is a steel building bolted to a cement footing/foundation and a poured cement slab floor. Prominent features including equipment, buildings, and tanks in the facilities area are shown on **Figure 3**.

The plant will operate 24 hours per day, approximately 350 days per year, not including unscheduled shutdowns/outages. The Occupational Safety and Health Administration (OSHA) will have jurisdiction for employee health and safety in the areas of the process operation beyond the feeder/hopper.

Plant Flow Details

The USOS's Ophus process is a proprietary extraction method that uses d-limonene, a biodegradable and non-toxic solvent derived from citrus products, for the separation of bitumen from sand. The non-proprietary components of the separation process are described in the following paragraphs.

The plant is designed to accommodate approximately 4,300 tons/day of ore, producing approximately 2,000 bbl/day of bitumen. The extraction process begins when the mined ore is sent through a crusher and reduced to a 0.75 inch minus size. The crushed ore is then conveyed to a heated slurry mixer where the solvent is introduced and the ore is slurried. The oil sands slurry is then pumped to two primary separation vessel (PSV #1 and PSV #2) where the separation of bitumen from the sand occurs. The liberated bitumen is captured and further cleaned in a centrifuge. The centrifuge removes fine particles from the bitumen. The bitumen is then transferred to a solvent recovery unit where solvent is recovered from the bitumen and recycled to the front of the process. The clean bitumen from the solvent recovery unit is pumped to the product (sales) tank for storage prior to transport.

The separated solids are dewatered on a screen filter and the recovered water is pumped back into the process water tank for reuse in the plant. To recover additional water, process streams are fed to a clarifier which uses flocculent to produce a thick solids slurry and recover clear water. The solids slurry is fed to another centrifuge and a dryer to recover all the possible water and solvent. Solids are then conveyed to a stockpile for loading and backhaul to the OIS or mine pit. There are no water losses to the bitumen product. Approximately 4% of the water goes out of the system with the solids being hauled back to the OIS or mine pit.

The plant flow diagram is included in **Appendix D**.

Solvent Storage & Handling

The solvent (d-limonene) is a stable, colorless liquid that evaporates when exposed to air, and has negligible solubility in water (Florida Chemical Co., 2011). It presents low risk to

humans and has been determined to biodegrade rapidly in the environment, similar to related chemicals that are known to be biodegradable.

The solvent will be stored as required in an approved storage tank with appropriately designed secondary containment **(Figure 3a)**. From the tank, the solvent will be pumped through closed piping to the mixer where it is blended with the incoming oil sands and water. After separation of bitumen in the solvent recovery unit, the solvent (without additives) will be pumped through closed piping back into the original storage tank.

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Power Source

Two natural gas generators located at the plant site will be used to supply all the electrical requirements for the process train. A three conductor, heavy gauge, armored power supply cable will be buried in the water line trench (described below) to convey power to the two nearby water wells.

Water Source

360 acre-feet of water from water right number 41-3523 has been allocated to **USOS** the operator from the Uintah County Water Conservancy District to supply water for the Phase 1 project. **The operator USOS** completed two wells to water, located approximately one half and one mile west of the plant site on SITLA land, under approval order 49-2274. Correspondence with SITLA and the State Engineers Office regarding right-of-way and approval to drill the wells is included in **Appendix B**.

These two wells will supply water for the plant. The easternmost well (former **USOS** exploration well #5) is completed to a total depth of 2,200 feet below ground surface in a deep aquifer. The finished casing diameter is 5.5 inches. The westernmost well (former **USOS** exploration well #6) is a 10-inch diameter well completed at 2,550 feet below ground surface.

To provide improved access to the well pad locations, the existing road was widened and re-routed in places. The road corridor is 30 feet wide inclusive of ditches. A supply pipeline will be installed on the south side of the road in an 11-foot wide corridor to convey water from the production wells to the processing plant site. The water line will be approximately 9,300 feet in length and constructed of approximately 4,200 feet of 4-inch pipe between the two production wells and 5,100 feet of 6-inch (outside diameter) HDPE pipe from the easternmost well to the plant site. The pipe will be buried to a minimum depth of 5 feet for insulation and protection. An armored power supply cable and pipe identification tag will also be buried in the trench to supply power to the well. The pipeline corridor construction disturbance will be reclaimed upon completion of construction.

At the terminal end of the pipeline (the plant site, **Figure 3**), water will feed directly to the raw water tank for storage. The raw water tank will then supply water to the process as needed. There will also be a pump to transfer collected storm water from the storm water retention pond to either of the two process water tanks to supply a portion of the make-up water.

OVERBURDEN/INTERBURDEN/SOLIDS STORAGE AREAS

During initial mine development, overburden and interburden removal will be completed by conventional mining methods. Overburden and interburden will be hauled to one of two OIS storage areas (**Figure 2**). This material will primarily consist of broken sandstones and shales. Grain sizes will vary from fine to coarse rock rubble (run-of-mine)

materials potentially as large as one cubic yard. Once mining has opened a large enough excavation to allow equipment movement and backfilling, mined overburden and interburden, along with the clean processed solids, will be placed in mined out areas of the pits (**Figures 4a-d**)(discussed in the next subsection).

The processed solids will contain less than 20 percent water and less than 4,000 ppm residual hydrocarbons and will contain approximately 80-85 percent coarse particles and 15-20 percent fine particles. The material will be hauled back to the OIS or pit backfill in trucks. The coarser fraction of the processed solids can be characterized as primarily quartz material in the 80-1,000 μm range ($d_{50} = 117 \mu\text{m}$), and the finer fraction is the sub-80 μm ($d_{50} = 18 \mu\text{m}$) material comprised of quartz, shale and clays. The density of the damp processed solids is roughly 2,850 pounds per cubic yard.

Index tests on sands and clays, and direct shear tests on sand and various blends of sand and clay were conducted by IGES in 2014 ([Seegmiller 2014](#)) on samples originating from representative site materials. Follow up work included triaxial strength testing on processed solids samples from [the operator's USOS](#) pilot plant work. Tests were conducted on a sand fraction and a clay or fine fraction. A blend of clays or fines and sands was tested under triaxial conditions. Conclusions of the stability analyses led to the conservative design for stable solids slope angles of 3H:1V ([Seegmiller 2014](#)).

Outfacing OIS storage area slopes will be graded no steeper than 3H:1V angle. Outfacing OIS storage area slopes will be reshaped and concurrently reclaimed as mining progresses. The toes of the outfacing OIS storage area slopes will tie into the existing topography and in some locations will contain interceptor ditches to sequester and contain sediment during the revegetation process. Erosion control BMP's will be used as needed on areas of high sediment transport risk while vegetation is being reestablished. Appropriate BMPs may be used to prevent transport of any sediment or eroded material off the site. Representative drawings are provided in [Appendix G](#). Erosion control BMP's may include rip-rap, straw wattles, erosion control blankets, silt fence and rock/log checks. Surface armoring with rock may be needed in areas where water pathways may develop.

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In addition to outfacing slope design at 3H:1V based on the above-noted stability analyses, and to ensure OIS storage area stability for perpetuity, coarse overburden/interburden rock will be strategically placed to promote drainage. These internal rock corridors within the OIS are designed to promote drainage of meteoric infiltration on the storage areas. This is described further under backfill storage areas.

BACKFILL STORAGE AREAS

Once mining has opened a large enough excavation to allow equipment movement and backfilling in Pit 1, the overburden, interburden, and processed solids can be placed in the mined out pit as backfill (**Figures 4a-d**). Haul truck dump points will vary as needed in order to backfill the pits at the desired sequence. Mined out pit areas will be utilized to contain overburden, interburden and solids from the extraction plant similar to the OIS storage areas. Outfacing backfill slopes will be graded no steeper than 3H:1V angle. Outfacing backfill slopes will be reshaped and concurrently reclaimed as mining progresses. The toes of the outfacing backfill slopes will tie into the existing topography and in some locations will contain interceptor ditches to sequester and contain sediment during the revegetation process. Erosion control BMP's will be used as needed on areas of high sediment transport risk while vegetation is being reestablished. ~~Erosion control BMP's may include rip-rap, straw wattles, erosion control blankets, silt fence and rock/log~~

~~checks~~. Surface armoring with rock may be needed in areas where water pathways may develop. Since the affected area is an arid climate, it is anticipated that evapotranspiration will occur for most of the meteoric water falling on the backfill areas. Natural drainage of the backfilled pits ~~maywill~~ also be encouraged through the placement of internal coarse rock drainage corridors during construction of the backfill areas.

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These drainage corridors will be constructed in strategic areas of the backfill, such as low areas on the pit floor, where water (if any) will naturally migrate. The void spaces in the coarse rock used to construct these drainage corridors will provide water a pathway to drain from and exit the backfill. ~~This prevents water from building up in the backfill over time due to meteoric water infiltration. Water build up over time can cause increases in pore pressure in the backfill and OIS areas which reduces the stability of the slopes (Seegmiller 2014).~~ Due to the minor flow rates anticipated, waters exiting the backfill or OIS areas through these drain corridors are anticipated to dissipate rapidly either through infiltration into the native soils or evaporation. ~~Appropriate Sediment control using straw wattles or similar~~ BMPs may be used to ~~protect the backfill slopes and to~~ prevent transport of any sediment or eroded material off the site. See the SWMP in **Appendix G** for more detail.

The estimated capacity associated with the three open pits, as well estimated volumes associated with the materials (i.e., mined overburden and interburden, and the processed solids) that will eventually be placed as backfill are provided in Section 106.4. A conservative bulkage factor of 30 percent has been applied to the solids material and a 15 percent bulkage factor applied to the overburden/ interburden materials in volume calculations. Material compaction may reduce these bulking factors. Final bulkage factors will be determined after actual field measurements can be completed. **Figures 4a-d** show the annual sequential development and concurrent backfill, and demonstrate that only a portion of the pit areas will remain open at any one time. As described in the Reclamation Section below, backfilled final pit slopes angles will be no greater than 3H:1V and will be sloped to this angle during filling to minimize re-grading efforts.

MAN CAMP

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The operator USOS operates a man camp on an as-needed basis to house seasonal employees and contractors. It is located within the PR Spring lease block, approximately two miles northwest of the plant site (**Figure 1 and 2**) along Seep Ridge Road. The man camp may include office trailers, housing, kitchen areas and space for personnel to park self-contained travel trailers. As needed, the man camp will be supplied with potable water and toilet/shower facilities where the waste water will be contained and serviced from a commercial source offsite. The man camp is accessed directly from Seep Ridge Road by a short access road.

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106.3. Disturbance

The following acreages will be disturbed by mining and related operations, as based upon the full Phase 1 development (see **Figure 4d**, **Figure 1**, and **Figure 2**):

Table 1: Disturbance Areas

Facility	Area (acres)
Phase 1 Mining and Processing Area	
Plant site including office and processing facilities	20.6
Haul Roads	11.3
Pit 1	25.5
Pit 2	136.2
Pit 3	73.8
OIS storage areas	27.5
Storm Water Management Areas	6.9
Topsoil storage area adjacent to plant site	1.0
Topsoil storage area on pit*	(3.8)
Subtotal	302.8
Ancillary Areas	
Man camp	4.0
Production Well Area	
- 2 well pads	2.7
- road/pipeline	6.7
Sub-total well area	9.4
Sub-total ancillary area	13.4
Total disturbance	316.2

* not included in total, since this is a movable feature integral to the pit acres

Roads other than the east haul road and the production water well road are not provided separately in the above acreage table because they are temporary and integral to other disturbed areas such as the pits. The short access road to the

man camp is included in the disturbance acreage listed for the man camp. Storm water management areas referred to in the table and shown on **Figures 4a-d** consist of a series of ditches and small storm water retention ponds to contain erosion and manage runoff. These are described further in the SWMP (**Appendix G**).

Phase 1 disturbance will occur over an estimated 5-year time period wherein mining will progress sequentially from pit 1 through pit 3, with sequential construction of the OIS storage areas and the pit backfilling, as shown on **Figures 4a-d**. Table 2 provides an approximate cumulative disturbance acreage estimate by year, to correspond to this mining process. The actual acreage disturbed in a given time frame may vary from the information below, but in no case will exceed the total given for the year 5 disturbance.

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Table 2: Cumulative Disturbance by Year (Approximate)

Year	Cumulative (running total) Disturbance (acres)	Estimated Reclamation (acres)	Approximate net disturbance (acres)
Year 1	95		95
Year 2	133	10	123
Year 3	223	30	183
Year 4	280	40	200
Year 5	316	120	116
Year 6	316	107	9

106.4. Nature and Amount of Materials to be Mined

The materials to be mined are oil sands. In the Uinta Basin of Utah, the oil sands deposits are within overlain by the Green River Formation; a very tight formation with known aquitards created by the oil sand layers.—They contain lenticular beds of lacustrine sandstone saturated with bitumen separated by intervals of barren sandstone, siltstone, shale, mudstone and calcareous marl. —The overburden materials are comprised of siltstone and sandstone with interbedded shale; interburden layers between the oil sand deposits are expected to generally have the same characteristics as the overburden materials. **Figure 8** provides a geology map showing surface formations in the area, and **Figures 6a-be** provide cross sections through the Phase 1 area showing the oil sands beds.

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Table 3 provides total Phase 1 volumes, by mining year, of material to be mined, for each material type. While these numbers are given to the cubic yard, they should be considered as approximate, as the mining conditions and exact timing cannot be known with certainty. Annual reports submitted to DOGM will contain the actual quantities mined, as required. The mining areas have been characterized by layers including overburden, oil sand layers in the beds known from top to bottom as D, C, B, and A, and interburden. Overburden varies from 0 to 50 foot depth and averages 20 foot depth. Interburden thickness, where known, averages 30 feet. Bed D averages 11 feet in thickness, Bed C averages 23 feet in thickness, and Bed B bed averages 24 feet in thickness. Bed A is shown on cross sections but has been determined to be uneconomical to mine within the

Phase 1 area. Oil sands ore is further subdivided into ore and sub-grade in Table 3. Sub-grade ore has grade values less than the economic cutoff grade, but will be mined in order to recover the economical ore in the deeper beds. Sub-grade ore handling is described in Section 106.2.

Table 3: Material to be Mined (Approximate) During Phase 1

Material		Year 1 (Pits 1,2)	Year 2 (Pit 2)	Year 3 (Pit 2)	Year 4 (Pits 2,3)	Year 5 (Pit 3)	Total (All Pits)
		Volume Moved (yd ³)					
Overburden		325,578	670,983	5,868,646	1,669,366	437,709	8,972,282
D-Bed	Ore	738,472	591,684	676,580	719,650	677,413	3,403,798
	Sub-Grade	207,692	88,324	590,072	381,990	115,017	1,383,094
Interburden C/D*		13,855	84,393	331,474	364,327	80,751	874,799
C-Bed	Ore	64,733	255,844	3,153,870	2,798,131	2,427,812	8,700,390
	Sub-Grade	30,918	404,633	1,717,415	1,414,150	935,249	4,502,365
Interburden B/C*		-	626	293,013	591,797	175,471	1,060,906
B-Bed	Ore	-	-	245,222	835,277	240,191	1,320,690
	Sub-Grade	-	-	323,192	610,153	328,711	1,262,056
Interburden A/B*		-	-	20,547	2,544	-	23,090
Total Ore		803,205	847,528	4,075,671	4,353,058	3,345,416	13,424,878
Total Non-Ore**		578,043	1,248,958	9,144,358	5,034,325	2,072,908	18,078,592

*Bed layers

**Total Non-Ore = Overburden, Interburden and Subgrade Ore.

As shown in the table, the 5-year Phase 1 project will mine approximately 31.5 million cubic yards of material.

106.5. Existing Soil Types/Location and Extent of Topsoil

EXISTING SOIL TYPES

Soil types in the Affected Area include the: (1) Seepriid-Utso complex, 4 to 25 percent slopes, on the upper flats including the plant site, production well and pipeline, and man camp areas;(2) Tosca gravelly sandy loam, 25 to 40 percent slopes, where the terrain starts to drop off into the drainages; and (3) Gompers-Rock Outcrop complex, 50 to 80 percent slopes, on the steep, lower sideslopes.

The *Seepriid-Utso complex* is found from 8,100 to 9,200 feet elevation and occurs on the shoulders and summits of hills in the Mountain Stony Loam (browse) ecological site. It is derived from Aeolian deposits over residuum derived from sandstones and shales. Bedrock is generally 40-60 inches from the surface. The top 4 to 18 inches are loam to clay loam. Below 18 inches the soil becomes very channery. The soil is well drained and pH ranges from 6.6 to 7.8 in the top 18 _____

inches. There is some calcium carbonate accumulation below 24 inches. Sodium levels and SAR are very low. The soil supports shrubs with a grass understory.

The *Tosca gravelly sandy loam*, 25 to 40 percent slopes occurs from 7,500 to 8,200 feet elevation on the backslopes of plateaus in the Mountain Stony Loam (browse) ecological site. It is derived from slope alluvium derived from sandstone and shale. Bedrock is generally 40-60 inches deep. Topsoil includes up to 2 inches of organic material underlain by a gravelly sandy loam to 11 inches. Below this the soil is very gravelly to cobbly. The pH ranges from 5.1 to 8.4 in the top 11 inches and from 7.9 to 9.0 below this. Calcium carbonate increases with depth, with the highest percentage between 11 and 39 inches. This soil has very little sodium.

The *Gompers-Rock outcrop complex*, 50 to 80 percent slopes is found from 6,500 to 7,400 feet elevation on cliffs, erosional remnants, escarpments and ledges in the Upland Very Steep Shallow Loam. It is derived from colluvium over shale residuum. Bedrock is within 4-8 inches of the surface. The top 8 inches is a very channery silt loam to loam. It is well-drained; the pH is 7.9 to 9.0. It has a calcium carbonate percent up to 30, and an SAR up to 10.

Table 4: Soil Types

Soil Series	Ecological site	Topsoil depth (inches)	pH	CaCO ₃ %	Gypsum %	SAR	Precipitation (inches)
Seeprid-Utso complex, 4- to 25% slopes	Mountain Stony Loam (browse)	4-18 (avg. salvage depth 6 inches, assumed)	6.6 to 7.8	To 75%	0	0	16-22
Tosca gravelly-sandy loam, 25-40% slopes		0-11 (avg. salvage depth 4 inches, assumed,)	5.1 to 8.4	To 40%	0	5.0	16-22
Gompers-Rock outcrop complex, 50-80% slopes	Upland Very Steep Shallow Loam	0	7.9 to 9	To 30	0	5-10	12-16

LOCATION AND EXTENT OF TOPSOIL

Topsoil will be salvaged prior to mining from all areas where it is practical to salvage topsoil (slopes flatter than or equal to than 2H:1V), and it will be stored for reclamation. The topsoil pile(s) will be needed for short and long term storage. They may be frequently be depleted and regenerated as replacement and salvage are ongoing. The plant topsoil stockpile will be recovered when the plant site is reclaimed. For the purposes of the topsoil volume summary discussed below, Phase 1 in its entirety is discussed here. It is assumed that topsoil will be

salvaged from 121 acres of Seepriid-Utso complex soils and 158 acres of Tosca soils. The conservative assumption is that topsoil will not be salvaged from the 24 acres of Gompers-Rock outcrop complex due to the zero-depth thickness estimated above and/or due to its occurrence on slopes steeper than 2H:1V. Depending upon field conditions and true slope angles some of the Gompers soil may be salvageable.

Topsoil from the development of the man camp is stored in two piles within the man camp along the periphery of the site. Topsoil from the production well and pipeline/road is segregated and stockpiled on the back slopes of the bar ditches along the road.

Estimated topsoil salvage depths and volumes for the PR Spring mine and plant site are contained in Table 5 below.

Table 5: Soil Salvage Information (Phase 1 Mining and Processing Area)

Soil Series	Estimated Salvaged Topsoil depth (inches)	Estimated Area (acres)	Estimated Volume (cubic yards)
Seepriid-Utso complex, 4- to 25% slopes	6	121	97,607
Tosca gravelly-sandy loam, 25-40% slopes	4	158	84,884
Gompers-Rock outcrop complex, 50-80% slopes	0	24	0
Total	N/A	303	182,491

However, it is important to note this is an estimate only; actual soil salvage volume could be more or less than this amount. The actual amount salvaged would be dependent upon what is encountered in the field: all available topsoil would be salvaged, which in some areas may reflect a lesser thickness than assumed and in other areas may be a greater thickness than assumed. The amount calculated above is the amount upon which reclamation is based and for which bonding will be in place.

106.6. Plan for Protecting and Re-depositing Existing Soils

Salvaged topsoil will likely be collected with a scraper and a dozer used in combination depending upon the gradient and the presence of rock. It will be stored in topsoil storage areas shown on **Figures 4a-d**. Only limited topsoil will

need to be stockpiled long-term due to the sequential mining and concurrent reclamation. Most topsoil will be stockpiled for a very short time period, or will be directly hauled to areas prepared for immediate reclamation. Topsoils will be protected by seeding with a fast growing cover grass, such as slender wheatgrass and/or Sandberg bluegrass seeded at a total of 10 PLS (pure live seed) pounds per acre. Topsoil piles will have straw wattle or similar means of sediment control. A sign will be placed at each topsoil storage area, indicating the stockpile is topsoil. The salvaged vegetation will be placed adjacent to or on the surface of the pile to control erosion and promote growth. ~~beneath the salvaged soil.~~

Most topsoil will be deposited on areas prepared for immediate reclamation once mining and/or backfilling is complete in an area and the surface is at final grade. The estimated topsoil salvage balance was provided in Table 5 above.

106.7. Existing Vegetative Communities

Existing vegetation in and near the Affected Area includes mixed shrub and sagebrush/grassland communities on the ridgetops, with Utah juniper (*Juniperus osteosperma*) on upper slopes, trending to a Douglas fir (*Pseudotsuga menziesii*) community as elevation decreases. There are some aspen (*Populus tremuloides*) patches in the drainages. The Affected Area itself is primarily within the mixed shrub and sagebrush/grassland communities.

On August, 16, 2007 a quantitative vegetation survey utilizing 13 one-meter-square quadrats was conducted on plateaus and slopes located between 7,720 feet and 8,880 feet elevation, in the PR Spring lease block including within and immediately adjacent to the Affected Area (See **Figure 10** for quadrat locations, and **Appendix C** for vegetation survey data). On May 16, 2007 a qualitative vegetation survey listing all species noted was conducted on plateaus, slopes, and upper canyon sites located between 7,440 feet and 8,840 feet elevation on hilltops and hillsides within the mine area. Results of the vegetation surveys are summarized in Tables 6 and 7 below.

Table 6: Results of 13 cover transects surveyed August 17, 2007 to determine revegetation success standards

Life Form	Average Cover (percent)
Shrubs & Trees	50.3
Grasses	14.7
Forbs	2.7
Total vegetation cover	67.7
70% of cover value	47.4
Litter	12.7
Rock	16.7
Bare Ground	21.0
TOTAL	100.0

Scientific name	Common name	Relative abundance
<i>Maianthemum stellatum</i>	False Solomon's seal	Occasional under aspen
<i>Urtica dioica</i>	Stinging nettle	Occasional under aspen
<i>Descurainia pinnata</i>	Flixweed	Common under aspen
<i>Cirsium arvense</i>	Canada thistle	Occasional under aspen
Grasses & Grass-like		
<i>Poa sandbergii</i>	Sandberg bluegrass	Common at mid-hi elev
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Common at mid-hi elev
<i>Achnatherum hymenoides</i>	Indian ricegrass	Occasional at mid-hi elev
<i>Pascopyron smithii</i>	Western wheatgrass	Common at mid-hi elev
<i>Carex sp.</i>	Dry-land or mountain sedge	Common under firs
<i>Calamagrostis purpurascens</i>	Purple Reedgrass	Occasional under firs
<i>Bouteloua gracilis</i>	Grama grass	Occasional at mid-elev
<i>Poa pratensis</i>	Kentucky bluegrass	Common under aspen
<i>Leymus cinereus</i>	Ryegrass	Occasional under aspen
<i>Carex aquatilis</i>	Water sedge	Seasonally
<i>Scirpus sp.</i>	Rush	Seasonally

106.8. Depth to Groundwater

The depth to the regional groundwater table in the vicinity of the PR Spring Mine is expected to be 1,500 feet or more (Price and Miller 1975). The operator USOS's two production wells confirm this depth. The westernmost well is located at a ground surface elevation of 7,880 feet and is 2,550 feet deep. The easternmost well is located at a ground surface elevation of 8,043 feet and is 2,200 feet deep. The static water level in each is at approximately 6,400 feet in elevation, according to information on file with the State Engineer's Office.

No USGS mapped springs or seeps are located within the Phase 1 project area (see **Figure 9**). Further, a June 2014 site visit by the operator-USOS, DOGM, and DWQ, to specifically look for known and unknown seeps and springs, found no indication of springs, seeps, or other groundwater expressions within the Phase 1 area. In 2011 USOS the operator conducted extensive geologic exploration drilling at the site. The operator USOS drilled 59 exploration holes, at maximum depths of approximately 150 feet below ground surface, throughout the Phase 1 Project area and did not encounter groundwater (See **Figure 2**). These investigations confirm an absence of shallow ground water in the Phase 1 Project area. Groundwater is discussed further in Section 109.1 and in **Appendix B**, within correspondence supporting Permit-by-Rule coverage under the Utah DWQ's groundwater protection program.

Extent of Overburden Material

The oil sands beds outcrop in PR Canyon to the northeast of the mine area, and in Main Canyon to the southwest of the mine area (Murphy, Leonard A., 2003 private report). Based upon several coring programs in and near the Phase 1 project area, the operator USOS estimates that average depth to mineable ore (and thus overburden

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thickness) is approximately 20 feet, with areas near the outcrop having virtually no overburden, and areas on the southwest side having up to 50 feet of overburden.

Interburden extent is also a consideration in the Phase 1 project because multiple oil sands beds will be mined (**Figures 6a-bc**). Between Bed D and Bed C there is a layer of interburden that averages 30 feet in thickness; between Bed C and Bed B, interburden averages 25 feet in thickness. Bed D averages 11 feet thickness and the Bed C averages 23 feet in thickness. Bed B averages 24 feet in thickness. Volumes associated with overburden, interburden, and ore were provided in Table 3 above (see Section 106.4).

Geology

Bedrock on SITLA lands leased by the operator **USOS** includes thick, buff-to-cream, rim-forming, cross bedded sandstone cropping out in the bottom of Main Canyon. These rocks were mapped by Gaultieri (1988) as the Renegade Member of the Wasatch Formation consisting of medium to thick, indistinctly banded sandstone with sparse shale. These beds are overlain by the Green River Formation containing lenticular beds of lacustrine sandstone saturated with bitumen separated by intervals of barren sandstone, siltstone, shale, mudstone and calcareous marl. Five distinct asphalt impregnated sands, labeled A, B, C, D and E, with E the highest strata, occur in the upper portion of the Douglas Creek Member of the Green River Formation (Byrd, William D. 1970) and (Clem, K. 1984). The E bed is regionally known, but is not present locally in or near the Phase 1 project area. The beds crop out in PR Canyon to the northeast and Main Canyon to the southwest of County Road 2810 (Seep Ridge Road). All four of the local beds occur in an interval 240 to 290 feet thick (Murphy, Leonard A., 2003 private report). **Figure 8** provides a geology map. In the area of the opening pit, the strike of the beds is N 20° E, and the dip is 1.2-1.7° NW. The axis of the San Arroyo Anticline trends N 60° W veering to a S 45° W trend 1-2 miles east of the Affected Area. The strike and dip of the ore beds vary slightly throughout the planned mine area as the host formations are part of a gentle anticlinal structure, but dip probably averages about 1.5°.

The planned mining would extend into the B bed of the Douglas Creek Member, leaving the A bed intact. The Basal Member of the Green River Formation underlies the Douglas Creek Member and overlies the Wasatch Formation. According to Byrd (1970), this interval represents a transition in depositional environment from fluvial to typical lacustrine. Below that, the Wasatch Formation rests with slight unconformity on the Tuscher Formation; or, where the Tuscher Formation is missing, the Wasatch rests with greater angular discordance on the Mesaverde Formation (Byrd 1970).

R647-4-108. Hole Plugging Requirements

| All ore sands exploration holes that were previously drilled by ~~the operator~~ **USOS** under other DOGM approvals have been plugged according to the requirements of R647-4-108. All of the water exploration holes, with the exception of the two completed production wells that will be used to supply Phase 1 water, were also closed. Future closure of the water wells is not part of this NOI. Any additional exploration drill holes, if proposed, would be plugged as required.

R647-4-109. Impact Assessment

109.1 Surface and Ground Water Systems

SURFACE WATER

The PR Spring lease block is located on the Tavaputs Plateau along the southeastern rim of the Uinta Basin. Hydrologically, it is within the Green River watershed (in HUC 14060005), which is part of the Colorado River system. It includes the relatively flat interfluvium between PR Canyon and Main Canyon, as well as the headwaters of those canyons and adjacent tributaries. **Figure 9** shows watershed boundaries in the area, as well as other water features such as streams and springs or seeps. The Phase 1 project area is located on the drainage divide between PR and Main Canyons and extends southwestward into the Main Canyon watershed. Main Canyon and several of its tributaries (including Trail and Meadow Canyons) drain the majority of the PR Spring lease block area. There are no USGS-mapped springs or seeps in the Phase 1 project area. A May 28, 2014 site visit by [the operator-USOS](#), DOGM, and DWQ, to look for known and unknown seeps and springs, found no indication of springs, seeps, or other groundwater expressions within the Phase 1 project area. Main Canyon flows generally west and northwest, entering Willow Creek several miles to the west. Willow Creek in turn flows into the Green River near Ouray. PR Canyon and a tributary named Jacks Canyon drain northward, conveying snowmelt and runoff from the northeast part of the area. Although there is a small spring complex located in PR Canyon, flow in these channels is intermittent or ephemeral. PR Canyon is tributary to Sweet Water Canyon, Bitter Creek, and the White River, prior to the White River entering the Green River near Ouray.

Precipitation in this area is estimated at about 12 inches annually (Price and Miller 1975), which is generally not sufficient to sustain perennial flow in the smaller watersheds in this region. Instead, much of the area is dissected by numerous ephemeral drainages that, although channels themselves are small, are located within larger canyons with steep slopes. Because the majority of mining and mining-related surface disturbance will be located on the relatively flat interfluvium, there is negligible up-gradient watershed area that could contribute run-on.

The plant site will be constructed to be a self-contained area, through the use of perimeter berms or ditches where needed, as well as a storm water retention pond. All precipitation incident on the plant site (except that falling within other containment as described above in Section 106.2) will be collected in the storm water retention pond located at the low point of the plant site (**Figure 3**). If sediments accumulate in the pond, it will be cleaned as needed to maintain its design capacity. The SWMP (**Appendix G**) provides more information on runoff and sediment management.

Prior to reestablishment of vegetation on reclaimed backfill and OIS slopes, sediment control BMP's such as straw wattles, erosion matting, rip-rap and rock/log checks will be employed to reduce sediment transport from runoff. Areas forming drainage ways on these slopes will be armored with rip-rap. Interceptor ditches, placed in strategic locations, will transport water and sediment to storm water retention ponds. These storm water retention ponds will collect sediment and runoff from the haul road and adjacent areas. Their design and operation is described in more detail in the SWMP (**Appendix G**). Vegetation, once established, will be the primary sediment control and soil stability measure.

SPCC

An SPCC Plan will be prepared according to good engineering practices under the requirements of 43 CFR 112 to address all hydrocarbons that will be produced, stored, or used on site. The intent of the SPCC Plan is to comply with requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters. The SPCC Plan will include all containers, 55 gallons or greater, that contain oil; including fuels, oils and lubricants. Spill response procedures for the facility will be addressed in the SPCC Plan as well. When completed, the SPCC Plan will be submitted for inclusion in the NOI as **Appendix F**.

Storm Water Management Plan

According to DWQ, ~~the operator~~**USOS** does not need to obtain coverage under the State of Utah Multi-Sector General Permit for Industrial Discharges (see letter in **Appendix B**). All reasonable attempts will be made to implement and maintain BMPs to minimize impacts to downstream waters from the Phase 1 project. BMPs are described in a Storm Water Management Plan, which is attached in **Appendix H**. The Plan has been prepared to reduce the likelihood of inadvertent discharges of process waters or erosion-produced sediments. This subject is discussed further in Section 109.4 below.

GROUNDWATER

The oil sands deposit that would be mined during this project is located in the Green River Formation. The Parachute Member of the Green River Formation is the uppermost bedrock formation found throughout the region. This Formation includes various water bearing zones (including the Birds Nest and Douglas Creek aquifers), though they are apparently of limited extent and yield. The State Water Plan (Utah Division of Water Resources 1999) doesn't include any Green River Formation aquifers as significant enough to be targets for groundwater development, and information from wells and springs indicates generally low yields (Price and Miller 1975).

Underlying the Green River Formation at depth are the Wasatch Formation and the Mesa Verde Group. Price and Miller (1975) indicate that the potentiometric surface in the general area is 1,500 feet or greater below ground surface, with a

gradient to the north. As noted above, this was confirmed by the operatorUSOS's two production wells, located within about one mile of the Phase 1 project area. (One of those wells intercepted a small amount of water at a depth of about 670 feet, which is about the same elevation as the nearby Main Canyon floor.)

At their maximum depth of approximately 150 feet below ground surface, none of the three Phase 1 pits are expected to encounter or approach this regional groundwater table. Further, because mining occurs on the hydrologically isolated interfluvium between PR and Main Canyon, the Phase 1 mining will not affect groundwater gradient or quality. Litigation challenging the definition of groundwater in this area was eventually dismissed by the Secretary who determined that there was only a limited amount of shallow, localized groundwater at the site that is not part of a regional aquifer system (Supreme Court of the State of Utah opinion 2014 UT 25).

The operatorUSOS's use of up to 360 acre-feet per year of groundwater obtained from the two production wells that intercept the deep regional aquifer will not adversely impact the local groundwater regime. Water usage is estimated at approximately 168,480 gallons per day and 61.5 million gallons per year (189 acre-feet). The wells draw from the deep, low quality regional aquifer that is not a source for natural surface expressions or other wells in the region. The State Engineer confirmed this absence of connectivity in early 2014 in resolving a protest on a temporary change application to allow additional uses and places of use associated with the water right. The State Engineer found that neither production well is impacting a spring in the bottom of Main Canyon located approximately 3/4 mile south of one of the production wells and which discharges at an elevation of 7,440 (approximately 1,000 feet higher than the static water level in the wells).

The operatorUSOS and DWQ have reviewed the project's Permit by Rule coverage under DWQ's Groundwater Protection Program. DWQ continues to support the *de minimus* impact of the project (including the planned pit backfills with processed solids) on groundwater resources. Copies of related correspondence are included in **Appendix B**.

WATER RIGHTS

According to online records of the State Engineer's Office, (Utah Division of Water Rights) there are a number of water rights in the region, as shown in Table 8 and on **Figure 9**. None of these would be affected by the operator'sUSOS operations.

Table 8: Water Rights

Water Right No.	Water Source	Quantity (cfs)	Use	Water Right Owner
49-55	Unnamed Spring	0.002	Stock watering	John S. Purdy

Water Right No.	Water Source	Quantity (cfs)	Use	Water Right Owner
49-57	PR Springs	0.002	Stock watering	John S. Purdy
49-193	Unnamed Spring	0.025	Stock watering	Alameda Corp.
49-196	PR Springs	0.021	Stock watering	Alameda Corp.
49-262	PR Springs	0.011	Domestic & stock watering	BLM
49-495*	Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-496*	South PWR Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-497*	North PWR Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-498*	West Willow Reservoir #3	0.25	Stock watering & wildlife	BLM
49-499*	West Willow Reservoir #2	0.25	Stock watering & wildlife	BLM
49-500*	PR Reservoir	0.25	Stock watering & wildlife	BLM
49-504*	Jacks Canyon Spring	0.015	Stock watering & wildlife	BLM
49-1504	Unnamed Spring	0.05	Stock watering	SITLA
49-1505	Unnamed Spring	0.05	Stock watering	SITLA
49-1506	Unnamed Spring	0.05	Stock watering	SITLA
49-1508	Unnamed Spring	0.05	Stock watering	SITLA
49-1512	Horse Canyon Unnamed Spring	0.05	Stock watering	SITLA
49-1513	Horse Canyon Unnamed Spring	0.05	Stock watering	SITLA
49-1514	Horse Canyon Unnamed Spring	0.05	Stock watering	SITLA

*Online water right records indicate that these claims "[have] not been established in accordance with statute and [their] validity is in question."

In addition, the operator USOS, through an agreement with the Uintah Water Conservancy District, will use approximately 360 acre feet of water originally allocated under Water Right No. 41-3523 via a water rights transfer to Water Right No. 49-2274. The two previously discussed production wells are associated with this water right.

109.2 Wildlife Habitat and Federally Listed Species

Habitats in the Phase 1 mine area and surroundings are characterized by the flat-lying plateau above Main Canyon and PR Spring Canyon. Ephemeral drainages

drop steeply off the plateau into these canyons. Existing vegetation includes mixed shrub and sagebrush/grassland communities on the ridge tops, with juniper on upper slopes and side slopes, trending to a Douglas fir community as elevation decreases. There are some aspen patches in the drainages.

The Utah Division of Wildlife (DWR) Utah Conservation Database (UCD) lists plant and animal species that are federally designated as Threatened, Endangered, or are Candidates for Designation in Utah, or are listed as Sensitive Species by the DWR. Those that are listed as present in the southern portions of Uintah and/or the northern portions of Grand Counties are listed below in Table 9 (with the exception of listed fish species, since there is not adequate live water to support fish on or near the Affected area). The information was taken from the UCD website on April 24, 2014.

On August 6, 2014 the U.S. Fish and Wildlife Service (USFWS) withdrew the proposal to list Graham's beardtongue (*Penstemon grahamii*) and White River beardtongue (*Penstemon scariosus* var. *albifluvis*) as threatened species throughout their ranges or to designate critical habitat for these species. This is noted below in Table 9. The withdrawal was based on the conclusion that threats to these species and their habitats have been reduced.

The Utah Natural Heritage Program (NHP) of the DWR was contacted directly for information about known occurrences of species of concern. Their response letter, attached in the correspondence section (**Appendix B**), listed occurrences of the Mexican spotted owl (*Strix occidentalis lucida*) and greater sage-grouse (*Centrocercus urophasianus*) in the vicinity of PR Spring lease block. Species accounts are provided in the following sections.

Table 9: Threatened, Endangered, and Candidate Species that may be present at USOS PR Spring Mine

Common Name	Scientific Name	Status	Elevation in Feet / Habitat	Chance of Presence at Project Site
Shrubby reed-mustard	<i>Hesperidanthus suffrutescens</i>	E	6,000-7,000	None due to elevation
Clay reed-mustard	<i>Hesperidanthus argillacea</i>	T	4,725-5,750	None due to elevation
Uinta Basin hookless Cactus	<i>Sclerocactus wetlandicus</i>	T	4,500-6,500	None due to elevation
Graham's beardtongue	<i>Penstemon grahamii</i>	Withdrawn from listing	4,600-6,700	None due to elevation
White River beardtongue	<i>Penstemon scariosus</i> var. <i>albifluvis</i>	Withdrawn from listing	5,000-6,680	None due to elevation
Jones cycladenia	<i>Cycladenia Humilis</i> var <i>Jonesii</i>	T	4,000-6,800	None due to elevation

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The area intersects four plant communities: Sagebrush-grass, Mixed tall shrub, Pinyon-juniper-Douglas fir, and Aspen glade (**Figure 10**), as discussed in Section 106.7, Table 3, and in **Appendix C**. Revegetation, discussed below in Section 110.5, will not provide an exact replica of vegetation removed, but will provide replacement vegetation to provide for a functioning post-mining land use.

109.4 Slope Stability, Erosion Control, Air Quality, Cultural Resources, Public Health & Safety

SLOPE STABILITY

All aspects of the Phase 1 project are designed to minimize slope stability risks. Each mining pit will be constructed predominantly on the relatively flat-lying terrain of the plateau top, minimizing slope-related risks. The OIS storage areas will also be constructed on relatively flat topography near the plateau top, intercepting only very small areas at the upper reaches of two small catchments. All mined or filled slopes, both interim and final, have been designed to be stable.

Regular and routine inspections will occur throughout the mine and extraction plant area to ensure the operating conditions remain safe, MSHA/OSHA safety guidelines are being followed, and the mining plan stated herein is being followed. This will include inspecting to verify the pit wall slopes are at the correct angles and they remain stable.

PITS

All three open pits will be excavated into the terrain, with highwalls maintained at approximately 1H:1V. Numerous existing road cuts and excavations in the area (including the operatorUSOS's 2005 production test pit) are stable with slopes steeper than 1H:1V, providing evidence of the conservative nature of the operatorUSOS's design. ~~Geotechnical analyses support the use of 1:1 pit wall slopes (Seegmiller 2013).~~ Any required blasting along the walls of the pit will be accomplished with small controlled blasts to eliminate over-break and weakening of the remaining material on the face of the slope.

As noted above, regular and routine inspections will occur to verify that the pit wall slopes are at the correct angles and remain stable.

OVERBURDEN/INTERBURDEN STORAGE AREAS

Two small overburden/interburden storage areas will be constructed during the initial mining to store materials prior to sufficient area being opened so that backfilling can occur. The storage areas will be located on the ridge plateau and upper hillslopes above Main Canyon. As constructed, the slopes associated with the overburden/interburden storage areas will be at a maximum grade of between 2.5H:1V to 3H:1V, to facilitate reclamation.

EROSION CONTROL

Runoff and erosion control is expected to be necessary at certain locations to prevent off-site erosional impacts. The SWMP in **Appendix G** discusses this in

more detail. Generally, surface water will be restricted to that generated by on-site precipitation: little or no up-gradient runoff will enter the site. What surface water runoff does occur will be controlled such that erosion is minimized. Mine site storm water control is shown on **Figure 7**.

Some of the specific means of handling runoff and controlling erosion are described below, with more detail contained in the SWMP. In addition, should any specific means of handling runoff and controlling erosion be found to be ineffective, the operator USOS would replace them with another type of BMP. These structures will be industry standard, using similar materials, installation techniques, and maintenance protocols as specified in DOGM's reclamation guide (DOGM 2008).

~~As recognized by Seegmiller International (2013), saturated conditions in process solids lead to reductions in slope stability. Since the affected area is an arid climate, it is anticipated that evapotranspiration will occur for most of the meteoric water falling on the backfill areas. In addition to initial moisture present in process solids, meteoric water may infiltrate the backfill.~~ To prevent material saturation and promote backfill stability for perpetuity, coarse overburden/ interburden rock will be used internally in the construction of the backfill to create small drainage corridors in areas where free drainage can be promoted. As backfill areas reach their final configuration and blend with natural topography, these areas will be covered with topsoil and revegetated as reclamation is completed. Appropriate BMPs may be used to prevent transport of any sediment or eroded material off the site. Sediment control using straw wattles or similar BMPs may be used to protect the backfill slopes. Their intent will be to catch eroded material and prevent transport via storm water off the site.

Most of the haul roads will be integral or adjacent to the pits, OIS storage areas, and backfill areas. Additional erosion control is not required in these areas. As needed, however, some haul roads may be ditched, to intercept and transport water to appropriate storm water ponds. The SWMP (**Appendix G**) provides more details on these road runoff and erosion control features.

The plant site will be constructed to be internally draining through the use of perimeter berms or ditches as needed to direct runoff. All precipitation incident on the site (except for precipitation that falls directly into one of the secondary containment structures for the tank farm and non-hydrocarbon liquid storage areas or the process sump) will be collected in the storm water retention pond located at the low point of the plant site (**Figure 3**). Sediment production from the plant site will be negligible, due to gradient and surfacing. Any sediment transported in runoff would eventually make its way to the storm water retention pond, which will be cleaned of sediments as needed. Sediment will be hauled to the backfill or OIS areas.

The man camp location is crowned such that the living areas are at the high point of the camp. Drainage is generally to the southeast and the site is designed so that no high velocity runoff channels would promote erosion of the camp area or adjacent land. Camp staff will monitor the perimeter of the camp area for signs of erosion or other water damage. The northwest side of the camp pad and access road are each constructed with drainage ditches along the perimeter of the structures to prevent water from pooling on the access road or along that side of the camp.

All BMPs will be regularly inspected, and maintained in operable condition. These above-noted types of BMPs are also described in the SWMP, which is included in **Appendix G**.

AIR QUALITY

The Phase 1 project is designed to minimize potential air quality impacts, including mechanisms or best management practices to minimize the following:

- Fugitive dust from stripped lands, the mine pit, OIS storage areas, backfill, and topsoil stockpiles.
- Fugitive dust from the plant site area and ore stockpiles.
- Emissions from the equipment used to mine, haul and separate bitumen from the ore.
- Fugitive dust from newly reclaimed lands.

Fugitive dust will be minimal from ore piles as the oily consistency of raw ore does not allow it to readily become airborne. Overburden and interburden may or may not be moist, depending on current weather conditions.

Once the oil is removed from the ore, clean processed solids remain. As the solids from the plant will be damp-dry (less than 20 percent moisture), wind generated airborne particles are expected to be minimal but will be actively monitored; if necessary, water trucks will be utilized to reduce and control any fugitive dust.

Haul roads will be sprayed regularly with water from a water truck. Water will be obtained from one of the production wells, in-pit storm water sumps or the processing plant storm water pond. Roads that are in use during most or all of the Phase 1 project may be covered with sub-grade ore to aid in dust suppression. Portions of the plant site may be similarly paved with sub-grade ore.

| The operatorUSOS will continue to coordinate with EPA on air permitting to sufficiently address the above air quality issues, including those associated with equipment emissions. The operatorUSOS intends to comply with the conditions set forth by EPA.

CULTURAL RESOURCES

Cultural resources were reviewed and inventoried onsite during surveys completed in April 2014 for the water wells and road/pipeline, April 2014 and May 2007 for the PR Spring Mine and plant site, and May 2011 for the man camp. No previously documented or new cultural resources were recorded (**See Appendix B**).

PUBLIC HEALTH AND SAFETY

The following measures are in place to protect public health and safety:

- MSHA safety guidelines will be followed in all aspects of the mining portion of the project.
- OSHA safety guidelines will be enforced for all aspects of the extraction plant downstream of the reclaim feed hopper as well as office, maintenance, and ancillary support facilities.
- There are no shafts or tunnels within the Affected Area and therefore none that require closing or guarding.
- All trash, scrap metal, and wood, and extraneous debris will be discarded in appropriate receptacles at a designated location prior to being routinely hauled offsite to a licensed facility. Further, volumes of material such as bitumen product and waste oil will be periodically removed from the site as needed so their allocated storage is not exceeded.
- Any exploratory or other drill holes will be plugged or capped as set forth in Rule R647-4-108.
- Warning signs will be posted in locations where public access to operations is readily available, including at the points of exit/entry from the main access road (Co. Road 2810) to the open pit and plant site.
- All blasting materials will be under the control and care of certified blasting contractors.
- Warning signs advising the public of blasting protocols will be posted at the access road to the pit area and at the appropriate locations as required by MSHA.
- All pit highwalls and areas where there is a leading edge embankment will be bermed.
- Adequate factors of safety will be maintained.
- During all ~~USOS~~ mining work in the vicinity of the Summit Midstream natural gas pipeline, the operator~~USOS~~ would operate safely and in cooperation with Summit Midstream to ensure safety of both operations and the public.
- Containers stored on-site will be labeled so that all materials are clearly identified. Salvageable materials and other wastes will be stored at the plant site within the fenced area. Small quantities of necessary chemicals, lubricants, and fuels will be stored in appropriate containers according to appropriate building and fire codes.

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R647-4-110. Reclamation Plan

110.1 Current Land Use and Post Mining Land Use

The current land use is mining, grazing, exploration, and wildlife habitat/open space. Due to the nature of exploration and ongoing activity in the Uinta Basin, the post mining land use may include exploration but is currently planned as wildlife habitat and open space. In order to ensure an environmentally safe and stable condition for the wildlife in the area that meets the objectives of the Utah Mined Land Reclamation Act 40-8-12, the operatorUSOS will leave safe, stable topography; remove man-made structures including tanks, ponds, and containments; and establish suitable native vegetation.

110.2 Reclamation of Road, Highwalls, Slopes, Etc.

If economics allow, mining may continue in other portions of the operatorUSOS's leases. In this case, facilities, and some roads may be maintained for access, and all new disturbances and operations would require additional approvals from DOGM. At this time, however, the mine/reclamation plan and associated bond estimate are based upon Phase 1 mining and the associated disturbance.

The overall objective of the reclamation plan described herein is to reclaim the entire Affected Area other than the wells and well access road, so as to allow post-mining land uses of oil and gas exploration and development, wildlife habitat and open space to resume. This objective will be met in part by removing facilities and structures that have been brought to the site, topsoiling, and reseeding, as described in more detail below. The intent is to meet the requirements of the Utah Rules at R647-4, as stated in Section 110.6 below, and to meet the objectives of 40-8-12 of the Utah Mined Land Reclamation Act which include provisions for a safe, stable, environmentally functioning site. Concurrent reclamation of open pits, via backfill disposal of overburden, interburden, and processed solids will spread the reclamation obligation over the life of the project.

Throughout the reclamation activities, visual inspections will regularly be made at the site, focusing on erosion and sediment control, further ensuring the reclamation goals can be met. It is anticipated further visual inspections will be made by DOGM, and will include ensuring that all reclamation activity obligations under the Utah Mined Land Reclamation Act and associated rules are being met. These inspections will continue until such time as DOGM approves the reclamation work and releases the surety.

Various types of equipment will be used to accomplish the reclamation objectives, as detailed in the surety calculations (**Appendix E**). This equipment includes, among others: dozers, graders, scrapers, cranes, hand power tools, dump trucks, loaders, semi- and low-boy trailers, water trucks, trackhoes, backhoes, and

seeders. The water truck will be used to provide dust suppression as needed, and water will come from one of the two production wells.

ROADS

Through final reclamation, ~~the operator~~USOS will maintain roads as needed to minimize erosion and off-site sedimentation. Such road maintenance will continue until the roads are fully reclaimed.

Roads needed for maintenance access to the water well/pipeline will not be reclaimed. The road segment to the man camp would be deep-ripped to relieve compaction, regraded to blend with site topography, and seeded.

Roads that are not integral to the pits, backfills or OIS storage areas would be reclaimed during final reclamation. These roads would be deep-ripped to relieve compaction, regraded to blend with site topography, topsoiled, and seeded. Except where bedrock is encountered, ripping will be a minimum of 24 inches deep, with ripper shanks spaced no more than 24 inches apart. In shallow bedrock areas, ripping depth may be less than 24 inches by necessity. Roads that are integral to the pits, backfills and OIS storage areas will be reclaimed as part of those features.

HIGHWALLS

No highwalls would remain at the end of mining as pits would be backfilled and/or graded off to blend with the existing surrounding topography.

SLOPES

All OIS storage areas will be graded during placement to a 3H:1V or flatter slope to achieve a stable, natural-looking landscape. While short segments may exceed this overall slope, no portion of the reclaimed slopes will be steeper than 26° and no areas will be so steep as to be unstable, cause safety hazards, encourage erosion, or hinder successful revegetation. The OIS storage areas and backfill areas will be re-contoured to blend with the surrounding terrain, provide a site amenable to revegetation, and minimize runoff and erosion. Concurrent reclamation will take place as portions of these OIS storage and backfill areas are completed. Any surface expression of rock from construction of internal rock drainage corridors will become part of the reclaimed surface, and be similarly topsoiled and seeded.

Safety and erosion control will be of primary focus during reclamation activities. As described further in Section 110.5, available salvaged topsoil will be applied to all areas with the exception of the armored drainage channels. The entire area will be seeded with native species to stabilize the soil, and provide for the post-mining land use.

PITS

Pits would be backfilled to their original volume or higher, with processed solids, and overburden/interburden. Since the pit floors will be backfilled concurrently as part of the mining process, they will not need to be ripped.

The resulting backfill contours will be graded to blend with surrounding topography, topsoiled, and seeded. Thus pits will not be impounding features upon final reclamation.

DRILL HOLES

Any additional exploration holes drilled during Phase 1 mining activities will be plugged and closed as prescribed in R647-4-108.

FACILITIES AND MATERIALS

All of the structures on the plant site will be taken apart and hauled away for reuse, resale or disposal (**Appendix E**). Inert materials, such as gravel, foundations, and small quantities of solids and reject materials would be integrated into the plant area recontouring efforts.

The man camp would be dismantled and all facilities removed. The site would be ripped, topsoiled, and seeded.

The production well and pipeline will be left in place maintained until the operator USOS determines these assets are of no further value to the company, at which time the operator USOS may elect to transfer ownership of these assets including infrastructure, water rights, maintenance and reclamation responsibilities to another appropriate entity. For reclamation purposes under this plan, the operator will cap the water pipelines at the wellheads and underground at the point of connection to the plant (Figure 11). The pipelines will be abandoned in place.

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Residual materials in the extraction plant equipment will be removed. The equipment will then be removed from the containment areas, disconnected from individual skids, and hauled away. All of the residual material will be separated into solid, aqueous, or hydrocarbon phases. The solid phase can be discharged on site to the mined-out pits, as it consists of the same materials that have already been placed in that area. The aqueous phase will be pumped to a tank or container for off-site disposal. Any remaining bitumen that is not sold to a refinery will be recovered with a vacuum and hauled off-site and disposed of appropriately. No hazardous materials presenting an impact to public health and safety will be disposed on site.

The re-bar reinforced concrete foundation under the warehouse and shop will be fractured to eliminate meteoric water ponding before being covered with native materials.

Non-geologic based liners will be removed from the site and disposed of at an appropriate disposal facility. Retention ponds will be filled or reshaped to blend into the surrounding topography and to prevent future water retention. Reserve,

processed solids, and reject rock stockpiles will be loaded into trucks and hauled back to pit where an opening will be made to place unused ore in the backfilled pit. The plant site area will then be regarded, ripped, topsoiled, and reseeded.

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Trash removal will occur after all buildings and facilities are removed; it will involve collection of all refuse, litter, stray metal, pipe, wood, insulation, and other debris. The area will be inspected to check for and collect trash.

There will be no shafts or adits, or similar structures that would require reclamation. As noted above under the "Pits" subheading, the pits will not be impounding after backfilling and reclamation.

110.3 Surface Facilities to Remain

The process plant, all associated support facilities, and mining equipment would be removed from the site, unless economic conditions allow for continued mining, in which case the plant site facilities and man camp would remain intact and require separate permitting. The production wells would be capped at the well heads. The water-and-access-road/ pipeline would remain in place and would be capped underground at the plant site as shown on **Figure 11** ~~would remain in place as stated above.~~

110.4 Treatment, Location and Disposition of Deleterious Materials

During operations, all new and spent fuel, oil, and lubricants will be stored within secondary containment as required by the SPCC Plan, as further described in the operations - processing, Section 106.2 and **Appendix F**. Any containers and their contents remaining at the end of operations will be removed to a licensed disposal facility prior to reclamation of the plant site. Any hydrocarbon spills that occur during mining operations will be dealt with as outlined in the SPCC Plan, and will not be a consideration during reclamation. Any fuel spills that occur during the reclamation process will be similarly managed.

Any other chemicals, including the solvent, present during operations, will be consumed during operations. Any of the stored substances remaining onsite at the end of mining will be properly removed and disposed of, prior to final reclamation. Any remaining fuels will be used to fuel equipment used in reclamation work. Fuels and liquids remaining after reclamation will be removed for disposal or re-use in accordance with relevant regulations. No acid forming or deleterious material will be left on-site.

110.5 Revegetation Planting Program and Topsoil Redistribution

Table 10, below, shows that all of the Affected Areas other than the well pads and road will be reclaimed by various methods. This includes redistributing topsoil on all areas except those associated with the armored drainage channels and the topsoil storage areas (soils will not have been salvaged on those areas, so original topsoil will remain).

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Vegetative matter gathered during the topsoil salvage operations and stockpiled as a component of those piles would also be spread along with the topsoil, providing organic matter and helping with soil moisture retention. Any additional salvaged vegetation that was stored in slash piles will be placed and redistributed on reclaimed areas in order to provide organic matter and surface roughness.

Equipment used for this task is likely to be a dozer, scraper, grader, and farm tractor/implements.

SEED BED PREPARATION

After the topsoil has been placed, areas will be disked if needed. This roughening will loosen soils to promote root penetration. A range land seeder equipped with separate seed boxes accommodating various seed sizes will be used to drill or scatter the seed mix into onto the soils. Alternatively, if a range land seed drill is not available, the seed will be broadcast. ~~seeding will be followed by disking the area to roughen the soils and work the seed into the soils. Bitterbrush will either be hand seeded and packed into each 'seed hill', or a packer wheel will be used if drill seeded.~~

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~~This roughening from a seed drill or disk will also loosen soils to promote root penetration.~~ The salvaged topsoil will provide a reasonable growth medium for the site. No mulch or fertilizer will be used in reclamation efforts. The final surface will be rough, creating small depressions for water retention sites and habitat niches.

Seed Mixture

A single seed mix (Table 11) will be used for all reclaimed surfaces and is based on sampling results and NRCS ecological site data. Any alterations beyond what is included in the list would require agency approval. All affected acres will be seeded. Seeding will be accomplished as described above. A tractor-pulled broadcast seeder or a range land seed drill will be used on all accessible areas. Smaller broadcast seeding or hand seeding may be required in some areas.

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Table 11: Seed Mix

SPECIES	SEEDS/LB	PLS* LB/AC
Forbs -		
Blue flax (<i>Linum lewisii</i>)	293,000	0.50
Rocky Mountain penstemon var. Bandera (<i>Penstemon strictus</i>)	592,000	0.25
Small burnet (<i>Sanguisorba minor</i>)	55,000	1.00
Lupine (<i>Lupinus caudatus</i> or <i>L. alpestris</i>)	27,600	1.00
Total forbs in seed mix		2.75
Grasses -		
Muttongrass (<i>Poa fendleriana</i>)	890,000	2.50 0
Canby bluegrass (<i>P. canbyi</i>)	926,000	4.50 0
Indian ricegrass (<i>Achnaetherum hymenoides</i>)	150,000	2.00
Great basin wildrye var. Magnar (<i>Leymus cinereus</i>)	130,000	12.00
Bluebunch wheatgrass (<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>)	140,000	1.53 00
Western wheatgrass (<i>Pascopyrum smithii</i>)	110,000	1.53 00
Total grass in seed mix		713.00
Shrubs -		
Sagebrush – Wyoming or Mountain (<i>Artemisia tridentata</i> <i>wyomingensis</i> or <i>vaseyana</i>)	2,500,000	0.25
Bitterbrush var. Lassen (<i>Purshia tridentata</i>)	15,000	2.00
Serviceberry (<i>Amelanchier alnifolia</i>)	25,800	1.00
Snowberry (<i>Symphoricarpos oreophilus</i> or <i>S. albus</i>)	75,000	1.00
Total in shrubs in seed mix		4.25

Total pounds of seed applied per acre: 1420.0 PLS lb/ac

* PLS = Pure Live Seed

Seeding Method

The seed mix will be drilled with a range land seeder equipped with separate seed boxes or be broadcast seeded or hand seeded as described above, on all areas that will be reclaimed, including OIS storage area slopes and pit slopes. Revegetation work, including both seedbed preparation and seed application will take place in the late fall season and seed would be spread as soon as possible following seedbed preparation.

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Other Revegetation Procedures

As noted throughout this document, all reclaimed slopes will be stabilized by leaving them at a 3H:1V or flatter and leaving them in a very roughened form to maximize infiltration and minimize runoff. It is important to note that there will be little to no run-on on these reclaimed surfaces.

All erosion control BMPs will be utilized during concurrent reclamation as well as the time from seeding up through the time when vegetation is successful.

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| The operatorUSOS will monitor for noxious weeds, and would provide weed control measures according to County directives should noxious weeds pose a potential problem. This will be done in the early summer months each year after reclamation until bond release has occurred. The monitoring would consist of a site visit by a person familiar with the potential noxious weeds, and a simple visual walk around the reclaimed areas. If any Noxious weeds are identified, the County would be informed of their extent, and actions taken as directed by them.

| Further, the operatorUSOS would qualitatively and visually monitor revegetation success for the first two years after reclamation, during the growing season. During the third summer, quantitative surveys, following the appropriate Division guidelines, will be conducted to assess revegetation success. This will determine whether revegetation has achieved 70 percent of the pre-mining cover, and survived after three growing seasons, as required by R647-4-111.13.11.

110.6 Statement

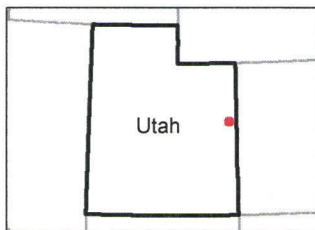
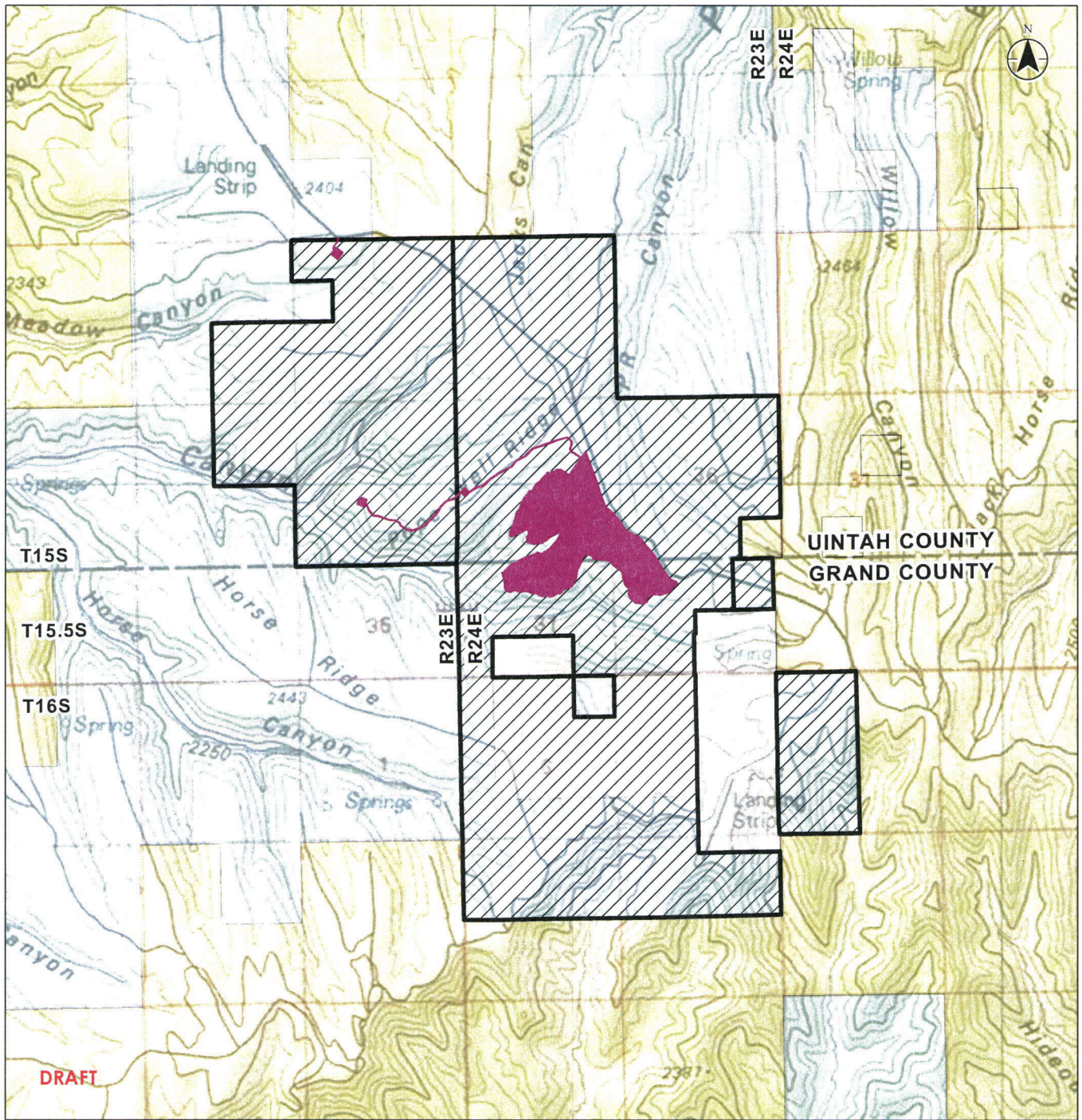
| The operatorUSOS would conduct reclamation as required under the Utah Rules R647-4.

References

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- USFWS 2007. Mexican Spotted Owl webpage at: <http://www.fws.gov/southwest/es/mso/>
- Utah Division of Water Resources. December 1999. Utah State Water Plan: Uinta Basin.
- Utah Division of Water Rights. 2007. Online Water Rights Records accessed <http://nrwrt1.nr.state.ut.us>.

Figures





Legend

- PR Spring Lease Block
- Phase I Affected Area

Ownership

- BLM
- Private
- State

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
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Project Location: Portions of T15S R24E, T15.5S R24E, and T16S, R24E
Prepared by CLP on 2014-10-07
Technical Review by IK on 2014-10-10
Independent Review by LM on 2014-10-30

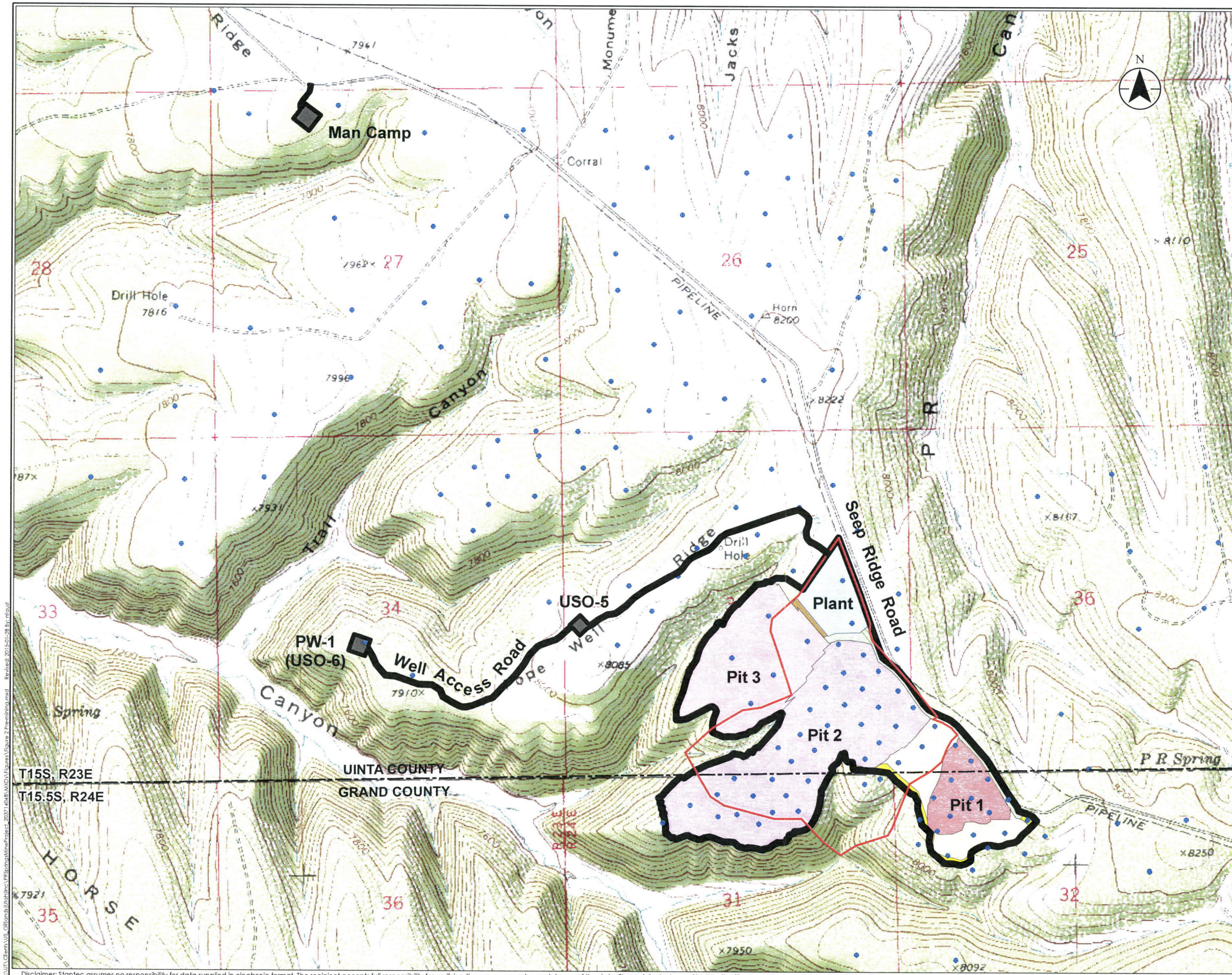
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PR Spring Mine

Figure No.

1

Title

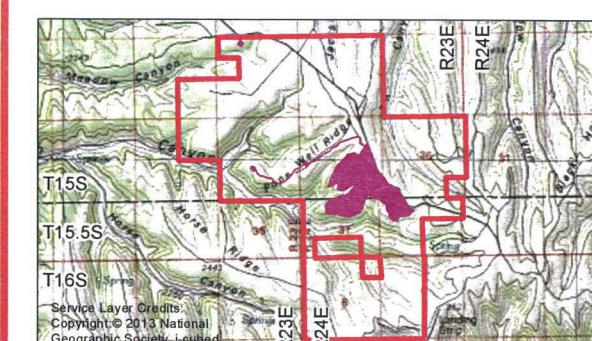
Project Location Map



- Legend**
- Previously Approved Permit Boundary
 - Phase I Disturbance Limit Boundary
 - County Line
 - Drill Hole
 - Pit 1
 - Pit 2
 - Pit 3
 - Plant
 - Stormwater Management Area
 - OIS Storage Area
 - Topsoil Stockpile
 - Haul Road Disturbance
 - Well, Well Access Road, and Man Camp

0 750 1,500 Feet
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- Notes**
- Coordinate System: NAD 1927 UTM Zone 12N
 - Modified from Norwest Corporation, 08/04/2014, T:\USOilSands\384-6



Project Location
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Utah and Grand Co., UT

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PR Spring Mine

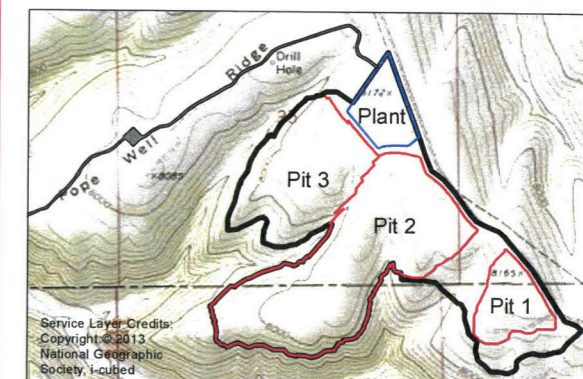
Figure No.
2

Title
Pre-mining Map

- Legend
- Plant Boundary
 - Berm
 - - - Culvert
 - Ditch

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- Notes**
1. Coordinate System: NAD 1927 StatePlane Utah Central FIPS 4302
 2. Modified from KBR, Figure 3 Overall Site Plan, 09/30/2014, F714-400-SP-NOI



Project Location: Portions of T15S R24E, T15.5S R24E, and T16S, R24E, Uintah and Grand Co., UT
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project:
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PR Spring Mine

Figure No.

3

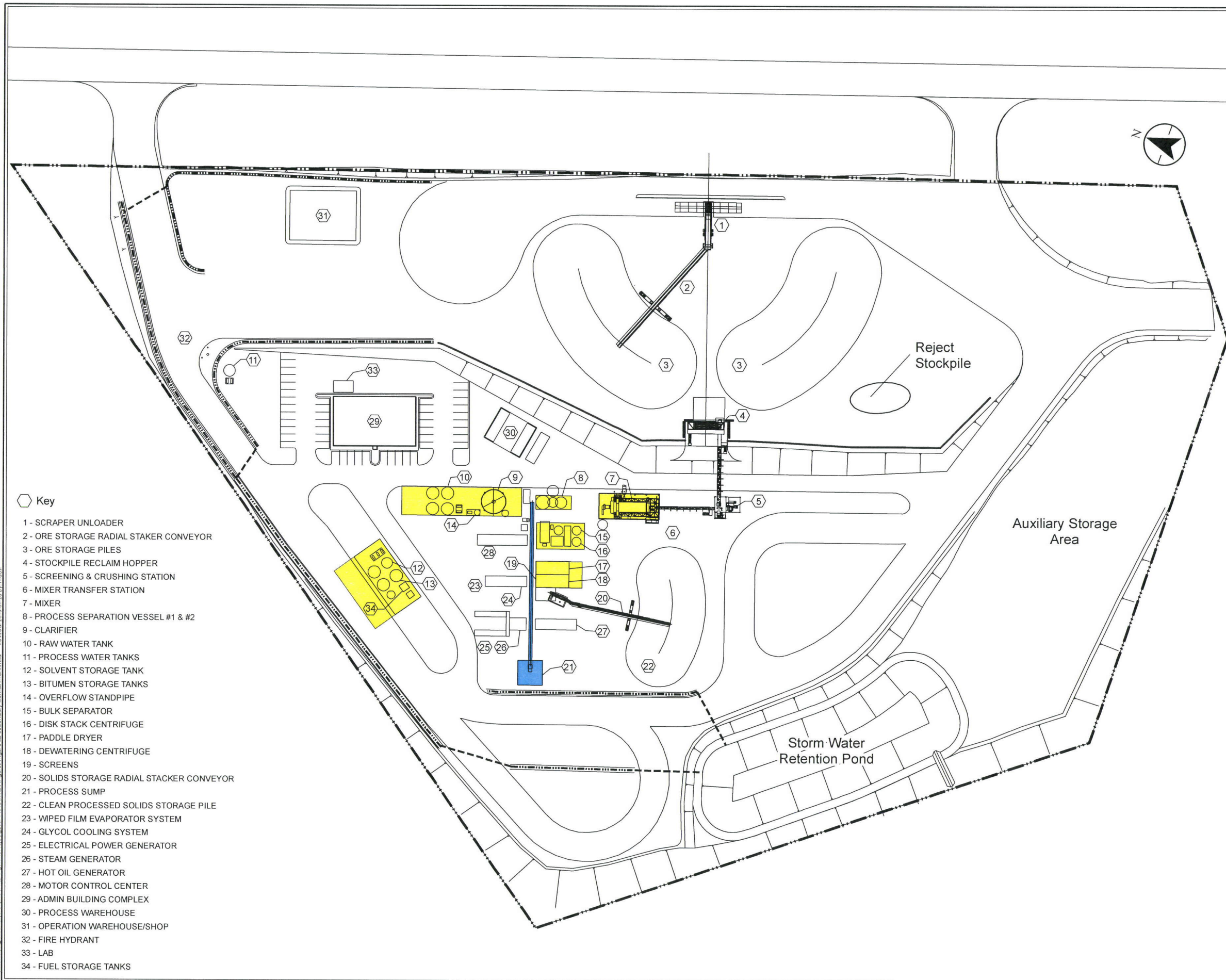
Title

Overall Site Plan

Key

- 1 - SCRAPER UNLOADER
- 2 - ORE STORAGE RADIAL STAKER CONVEYOR
- 3 - ORE STORAGE PILES
- 4 - STOCKPILE RECLAIM HOPPER
- 5 - SCREENING & CRUSHING STATION
- 6 - MIXER TRANSFER STATION
- 7 - MIXER
- 8 - PROCESS SEPARATION VESSEL #1 & #2
- 9 - CLARIFIER
- 10 - RAW WATER TANK
- 11 - PROCESS WATER TANKS
- 12 - SOLVENT STORAGE TANK
- 13 - BITUMEN STORAGE TANKS
- 14 - OVERFLOW STANDPIPE
- 15 - BULK SEPARATOR
- 16 - DISK STACK CENTRIFUGE
- 17 - PADDLE DRYER
- 18 - DEWATERING CENTRIFUGE
- 19 - SCREENS
- 20 - SOLIDS STORAGE RADIAL STACKER CONVEYOR
- 21 - PROCESS SUMP
- 22 - CLEAN PROCESSED SOLIDS STORAGE PILE
- 23 - WIPED FILM EVAPORATOR SYSTEM
- 24 - GLYCOL COOLING SYSTEM
- 25 - ELECTRICAL POWER GENERATOR
- 26 - STEAM GENERATOR
- 27 - HOT OIL GENERATOR
- 28 - MOTOR CONTROL CENTER
- 29 - ADMIN BUILDING COMPLEX
- 30 - PROCESS WAREHOUSE
- 31 - OPERATION WAREHOUSE/SHOP
- 32 - FIRE HYDRANT
- 33 - LAB
- 34 - FUEL STORAGE TANKS

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Legend

- Plant Boundary
- Berm
- - - Culvert
- - - Ditch

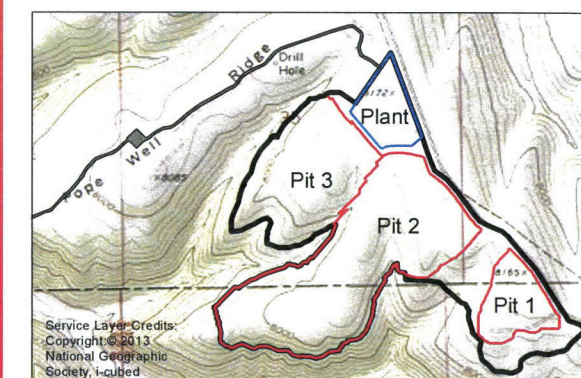
Secondary Containment

- Yellow Box: Berm & Liner
- Blue Box: Steel Tank/Pipe



Notes

1. Coordinate System: NAD 1927 StatePlane Utah Central FIPS 4302
2. Modified from KBR, Figure 3 Overall Site Plan, 09/30/2014, F714-400-SP-NOI



Project Location: Portions of T15S R24E, T15.5S R24E, and T16S, R24E, Uintah and Grand Co., UT
 Prepared by CLP on 2014-10-07
 Technical Review by KK on 2014-10-10
 Independent Review by LM on 2014-10-30

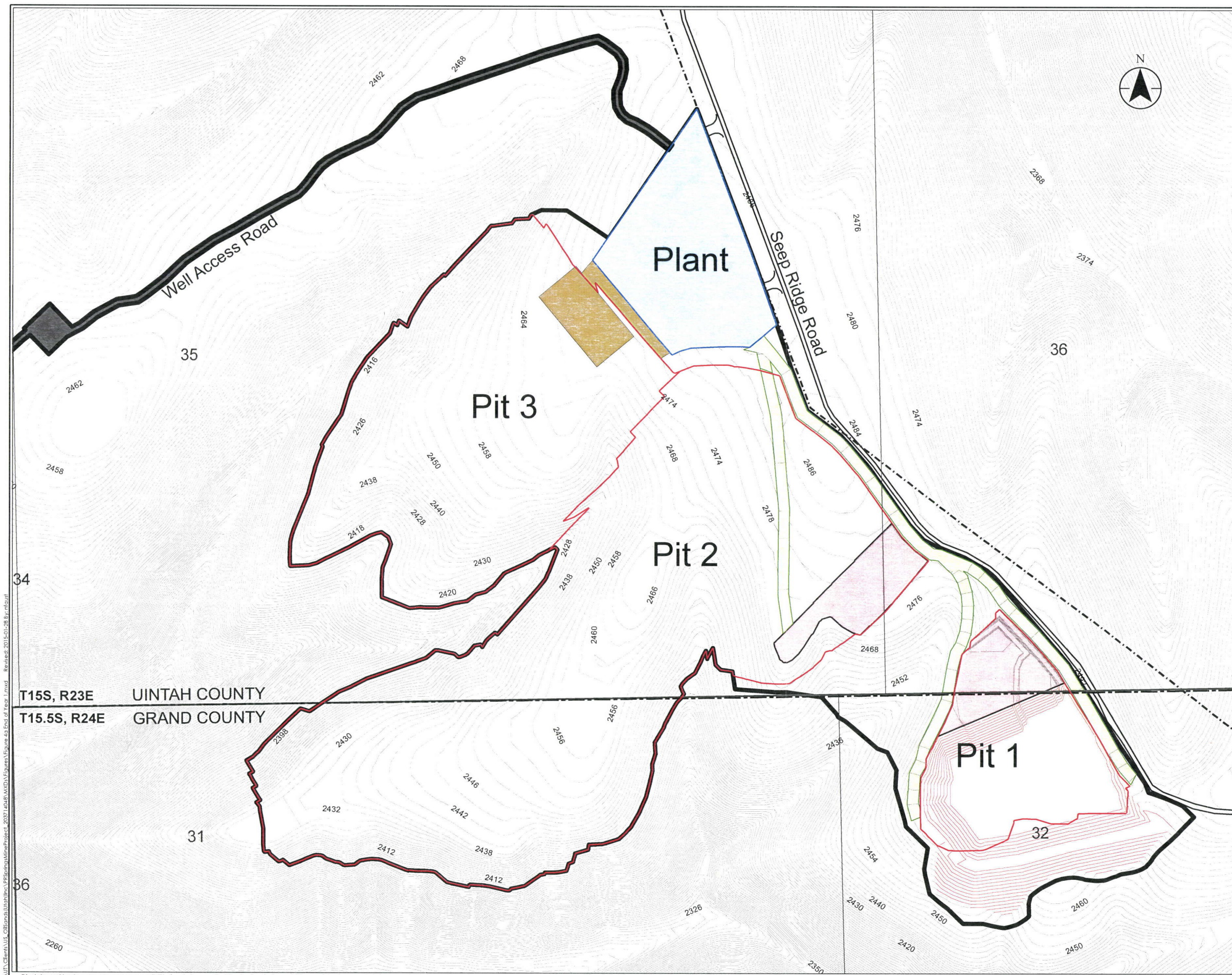
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 PR Spring Mine

Figure No.

3a

Title

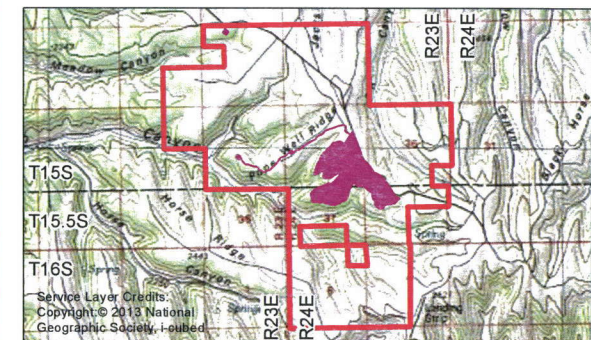
Secondary Containment



- Legend
- Phase I Disturbance Limit Boundary
 - County Line
 - Gas Lines
 - Roads
 - Topo Contours (2 meters)
 - Pit Boundary
 - Plant
 - Topsoil Stockpile
 - Well and Well Access Road
 - Active Mining Pit
 - Haul Road
 - Backfill Contours (2 meters)



- Notes
1. Coordinate System: NAD 1927 UTM Zone 12N
 2. Modified from Norwest Corporation, Quarter 4 Year 1, 08/04/2014, T:\USOilSands\384-6



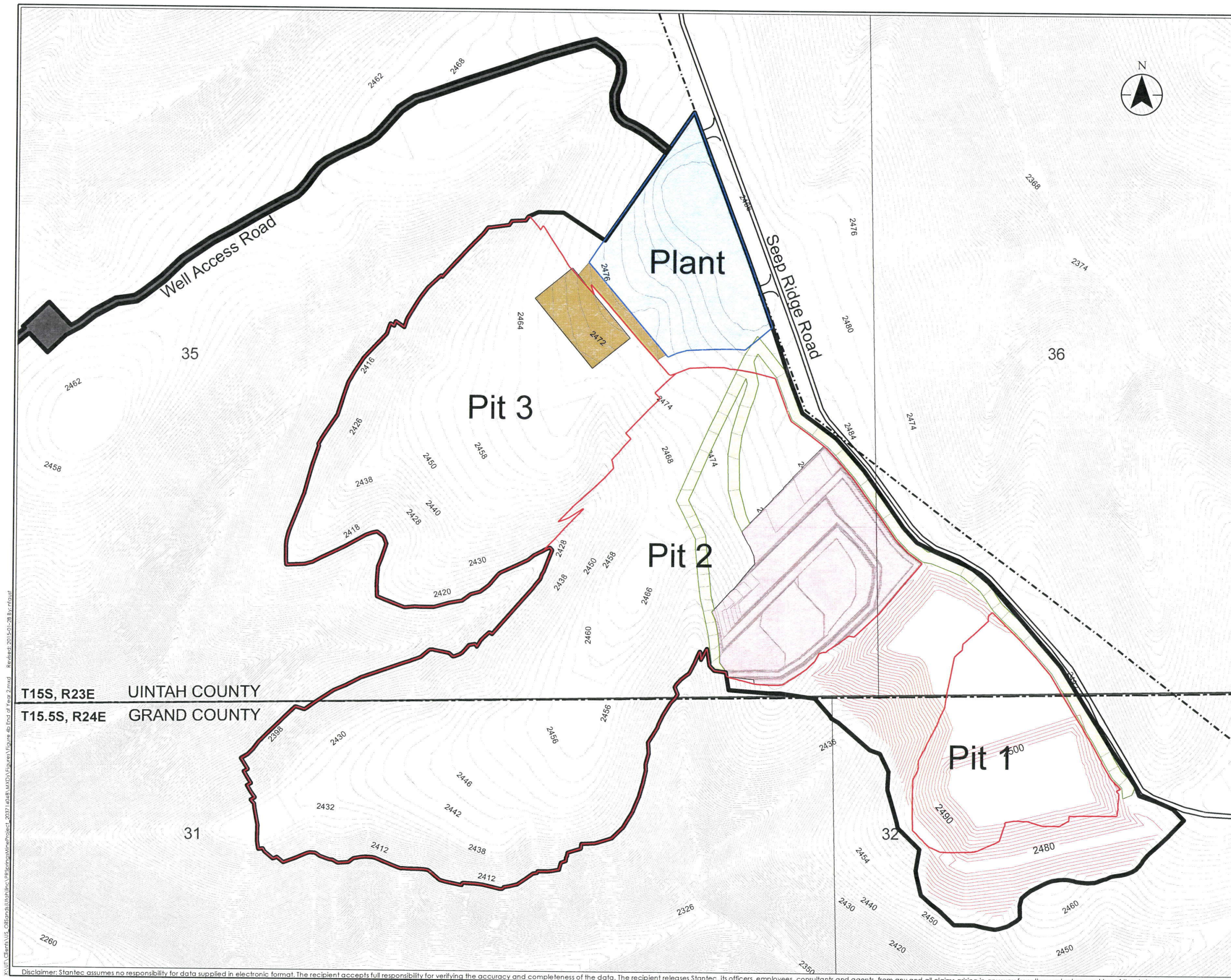
Project Location
Portions of T15S R24E,
T15.5S R24E, and T16S, R24E
Uintah and Grand Co., UT

203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
4a
Title
End of Year 1

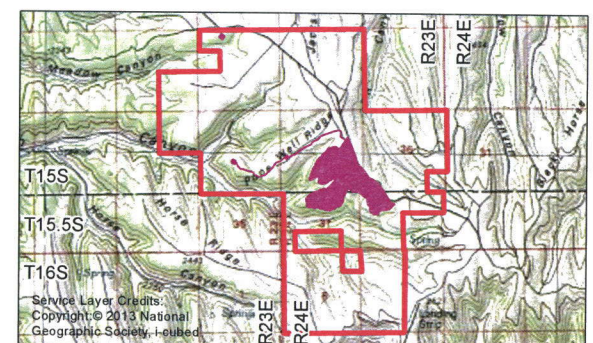
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Revised: 2015-01-28 By: nldout



- Legend
- Phase I Disturbance Limit Boundary
 - County Line
 - Gas Lines
 - Roads
 - Topo Contours (2 meters)
 - Pit Boundary
 - Plant
 - Topsoil Stockpile
 - Well and Well Access Road
 - Active Mining Pit
 - Haul Road
 - Backfill Contours (2 meters)



- Notes
1. Coordinate System: NAD 1927 UTM Zone 12N
 2. Modified from Norwest Corporation, End of Year 2, 08/04/2014, T:\USOilSands\384-6



Project Location
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Utah and Grand Co., UT

203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

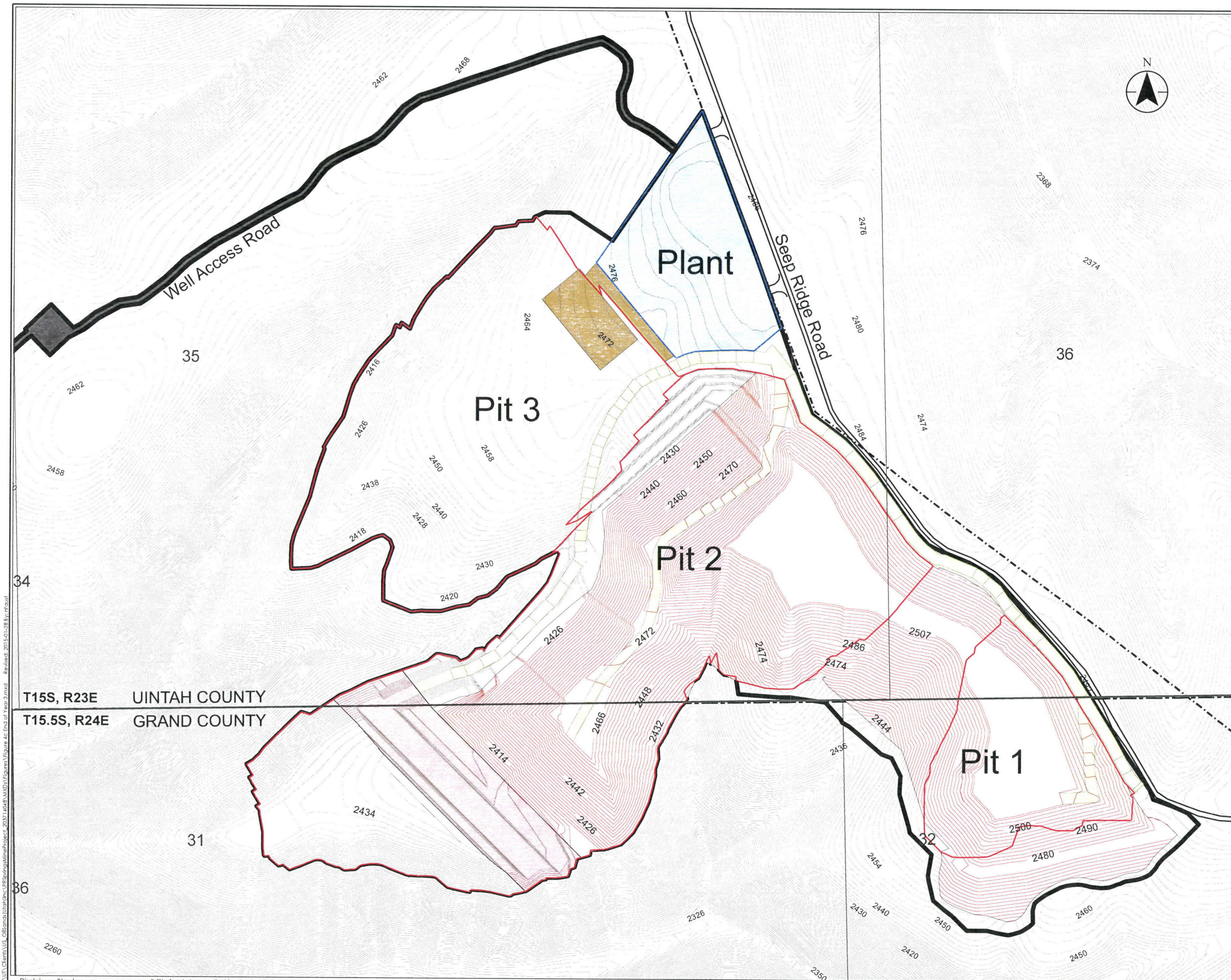
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Figure No.
4b

Title
End of Year 2

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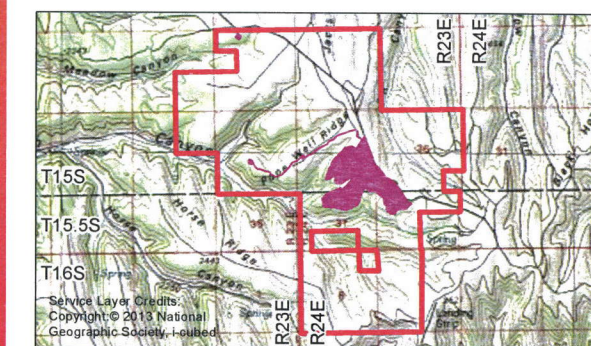
Legend

- Phase I Disturbance Limit Boundary
- County Line
- Gas Lines
- Roads
- Topo Contours (2 meters)
- Pit Boundary
- Plant
- Topsoil Stockpile
- Well and Well Access Road
- Active Mining Pit
- Haul Road
- Backfill Contours (2 meters)

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Notes

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Project Location
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Uintah and Grand Co., UT

203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

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PR Spring Mine

Figure No.

4c

Title

End of Year 3

- Legend
- Phase I Disturbance Limit Boundary

County Line

Gas Lines

Roads

Topo Contours (2 meters)

Pit Boundary

Plant

Topsoil Stockpile

Well and Well Access Road

Active Mining Pit

Haul Road

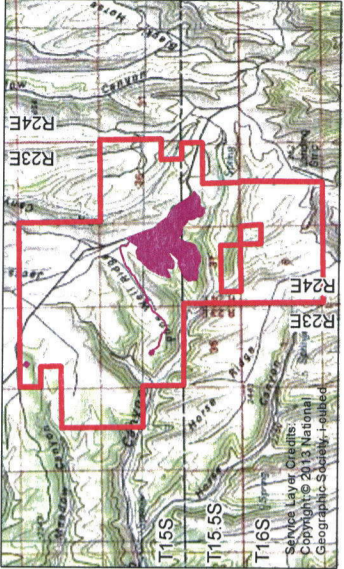
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Notes

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Project Location

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Prepared by CLP on 2014-10-07

Technical Review by KF on 2014-10-10

Independent Review by LM on 2014-10-30

T15.5S R24E, and T16S, R24E

Utah and Grand Co., UT

Client/Project

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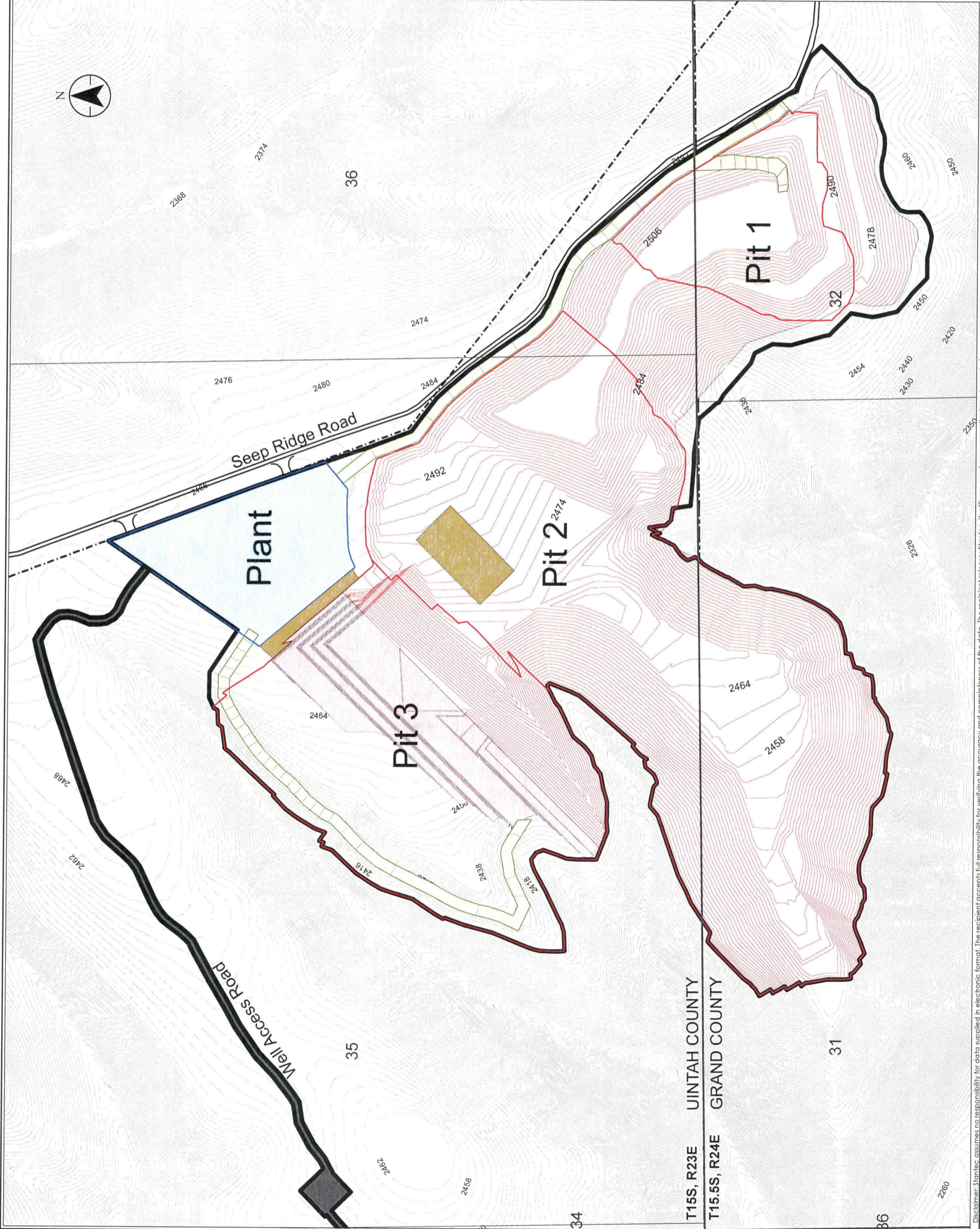
PR Spring Mine

Figure No.

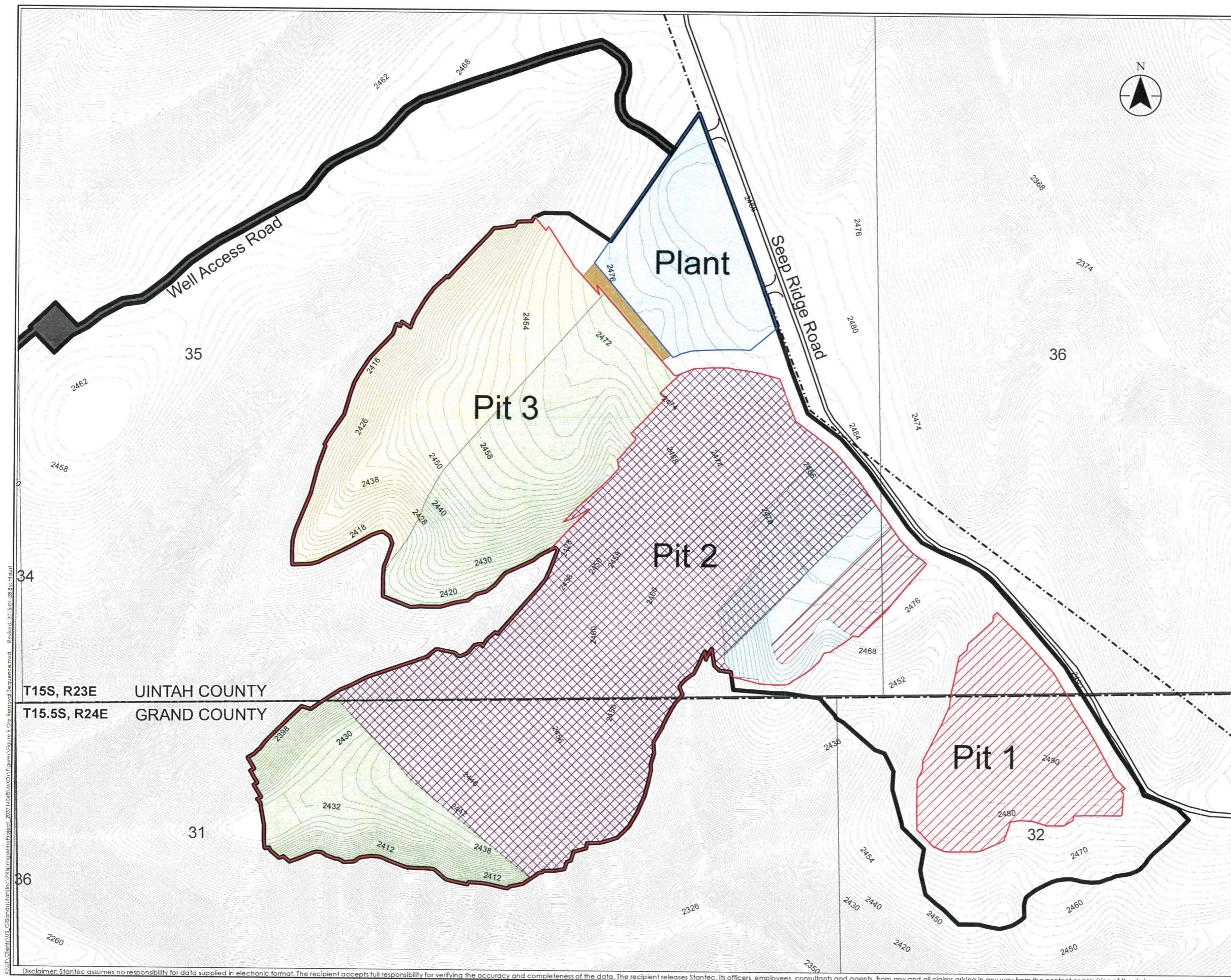
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Title

End of Year 4



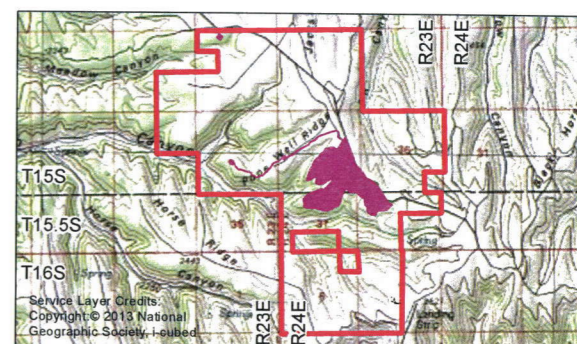
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- Legend**
- Phase I Disturbance Limit Boundary
 - County Line
 - Gas Lines
 - Roads
 - Topo Contours (2 meters)
 - Pit
 - Plant
 - Topsoil Stockpile
 - Well and Well Access Road
 - Ore Removal Year 1
 - Ore Removal Year 2
 - Ore Removal Year 3
 - Ore Removal Year 4
 - Ore Removal Year 5

Notes

1. Coordinate System: NAD 1927 UTM Zone 12N
2. Modified from Norwest Corporation, Ore Removal Sequence, 08/04/2014, T:\USOilSands\384-6



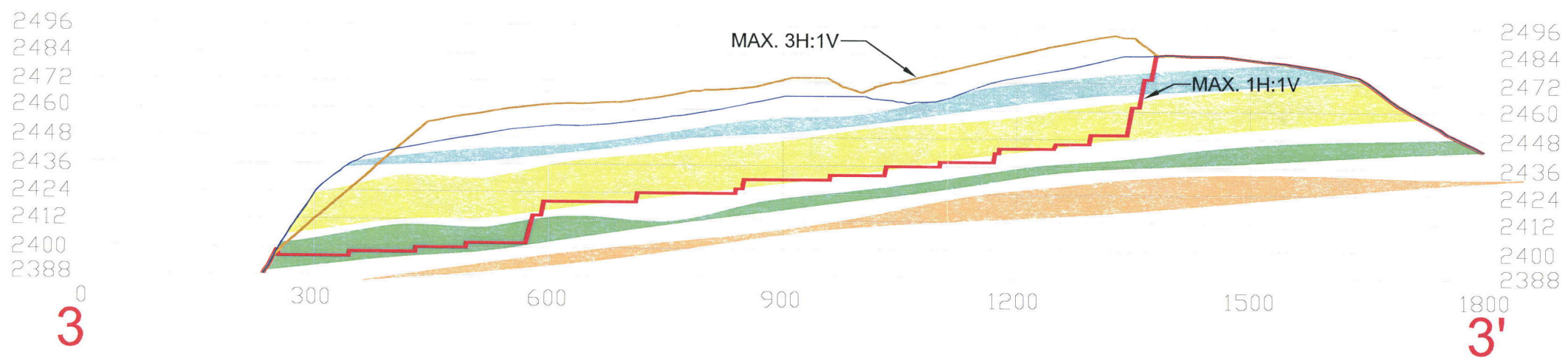
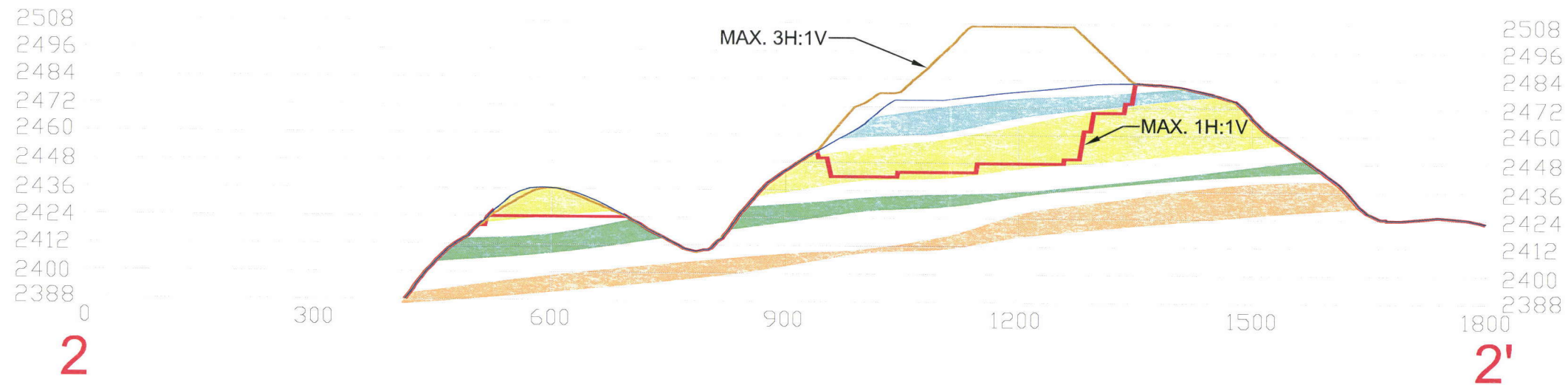
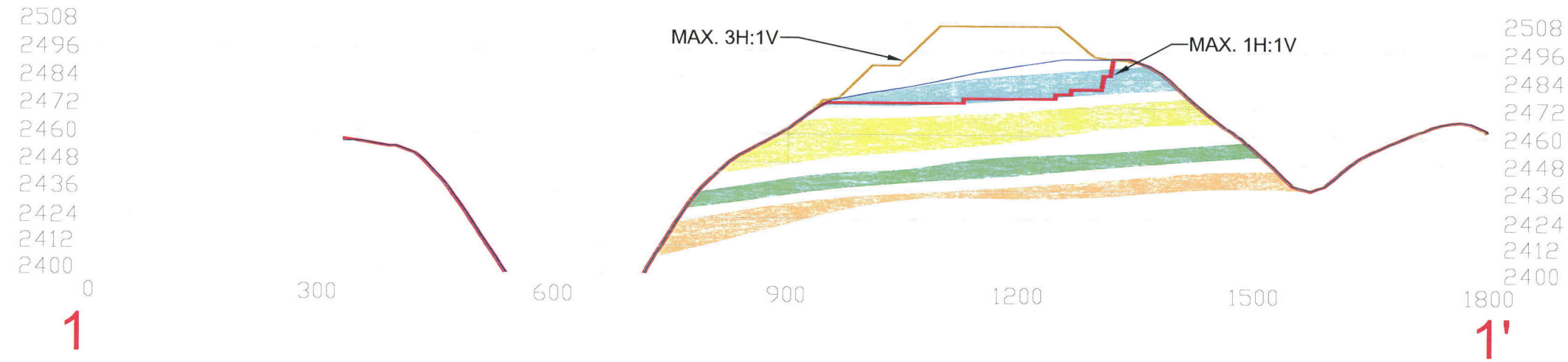
Project Location: Portions of T15S R24E, T15.5S R24E, and T16S, R24E, Uintah and Grand Co., UT
203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

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PR Spring Mine

Figure No.
5

Title
Ore Removal Sequence

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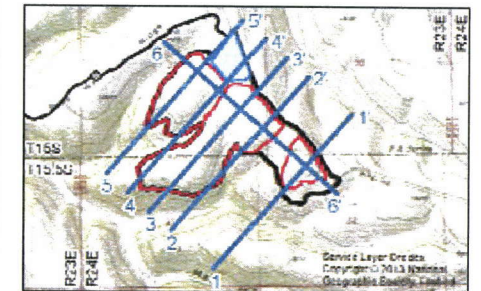


Scale= 1 Horizontal : 3 Vertical



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- Legend
- POST MINING RECLAIMED TOPOGRAPHY
 - ORIGINAL TOPOGRAPHY
 - ULTIMATE PIT LIMIT
 - OIL SAND BED D
 - OIL SAND BED C
 - OIL SAND BED B
 - OIL SAND BED A



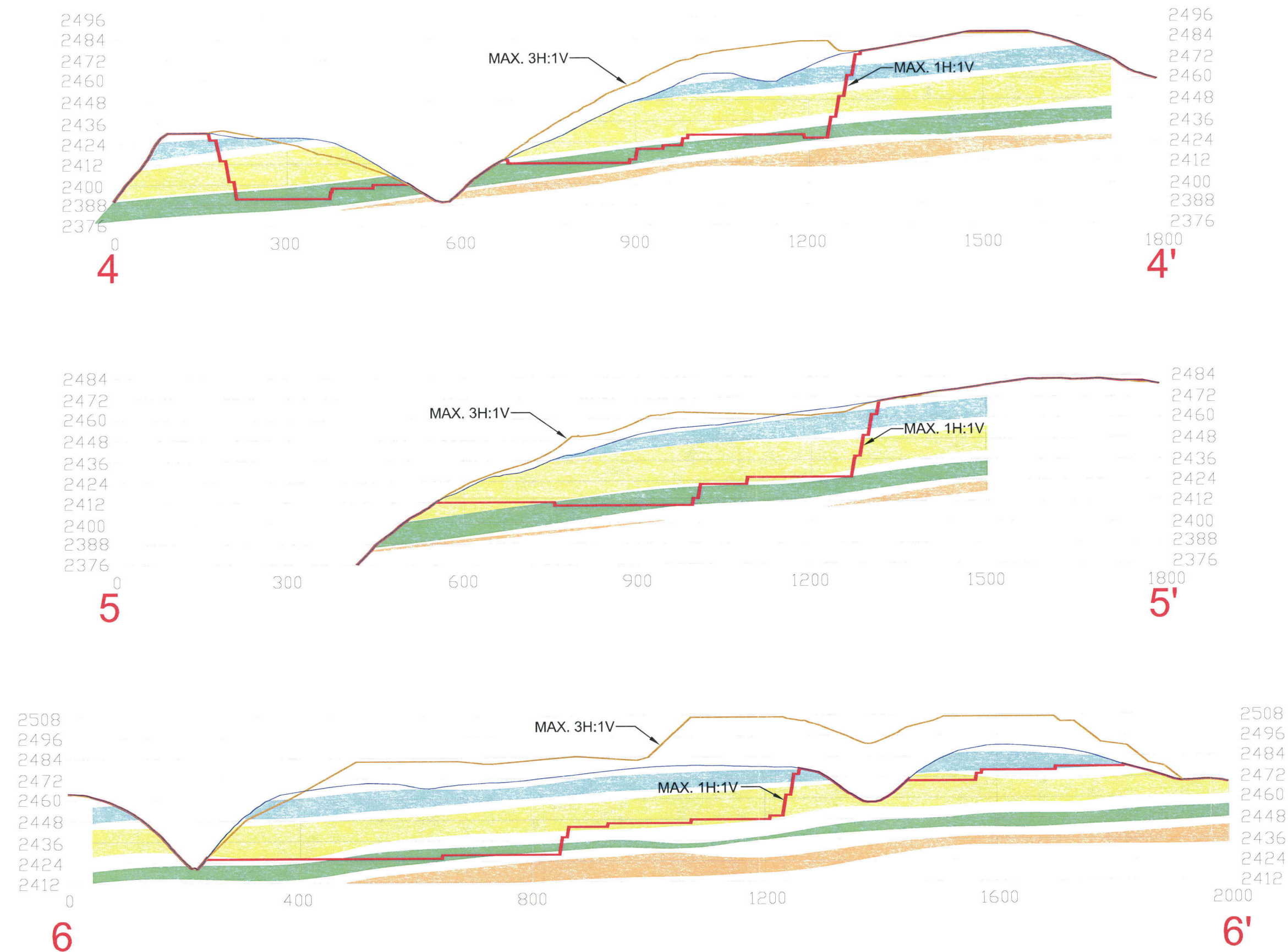
January 2015
203714048

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
6a

Title
Cross Sections 1 - 3

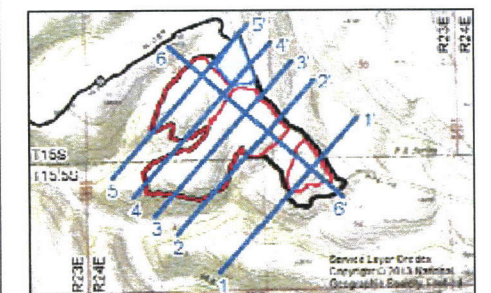
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Legend

- POST MINING RECLAIMED TOPOGRAPHY
- ORIGINAL TOPOGRAPHY
- ULTIMATE PIT LIMIT
- OIL SAND BED D
- OIL SAND BED C
- OIL SAND BED B
- OIL SAND BED A



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203714048

Client/Project

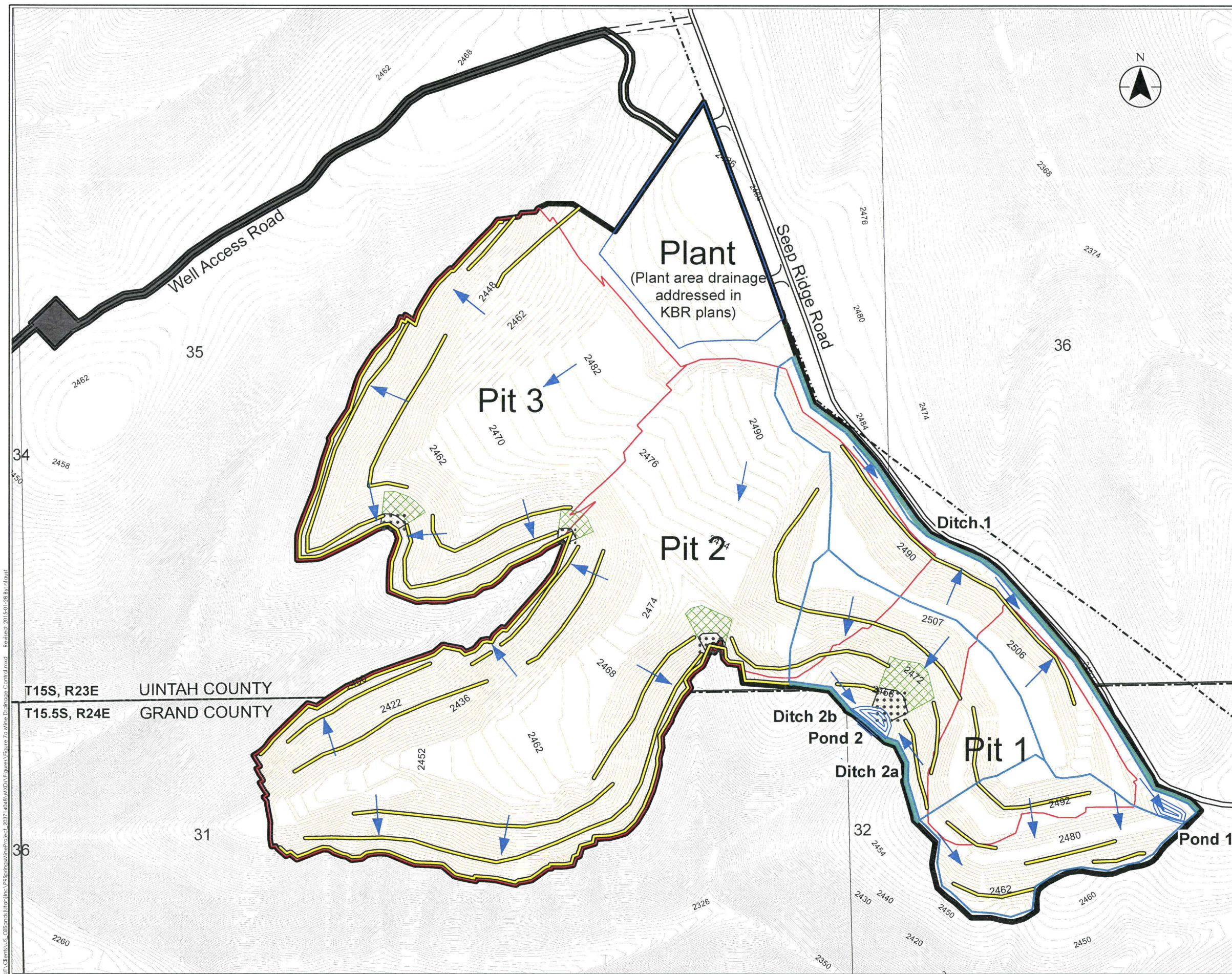
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Figure No.

6b

Title

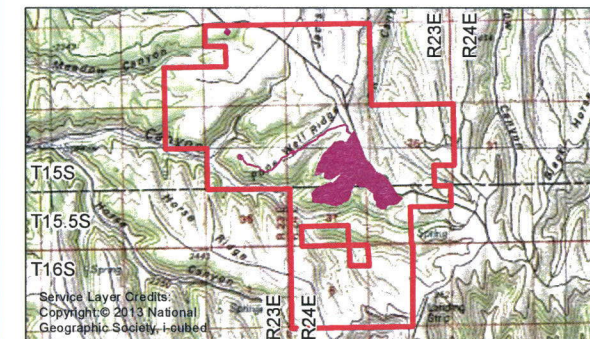
Cross Sections 4 - 6



- Legend**
- Phase I Disturbance Limit Boundary
 - County Line
 - Gas Lines
 - Roads
 - Topo Contours (2 meters)
 - Pit Boundary
 - Plant
 - Well and Well Access Road
 - Post Mining Reclamation Topography Contours (2 meters)
 - Ditch/Berm
 - Drainage Boundary
 - Flow Direction
 - Pond
 - Straw Wattle
 - Erosion Control Matting (not to scale)
 - Rip Rap (not to scale)



- Notes**
1. Coordinate System: NAD 1927 UTM Zone 12N
 2. Modified from Norwest Corporation, Mining Drainage Control, 08/08/2014, T:\USOilSands\384-6



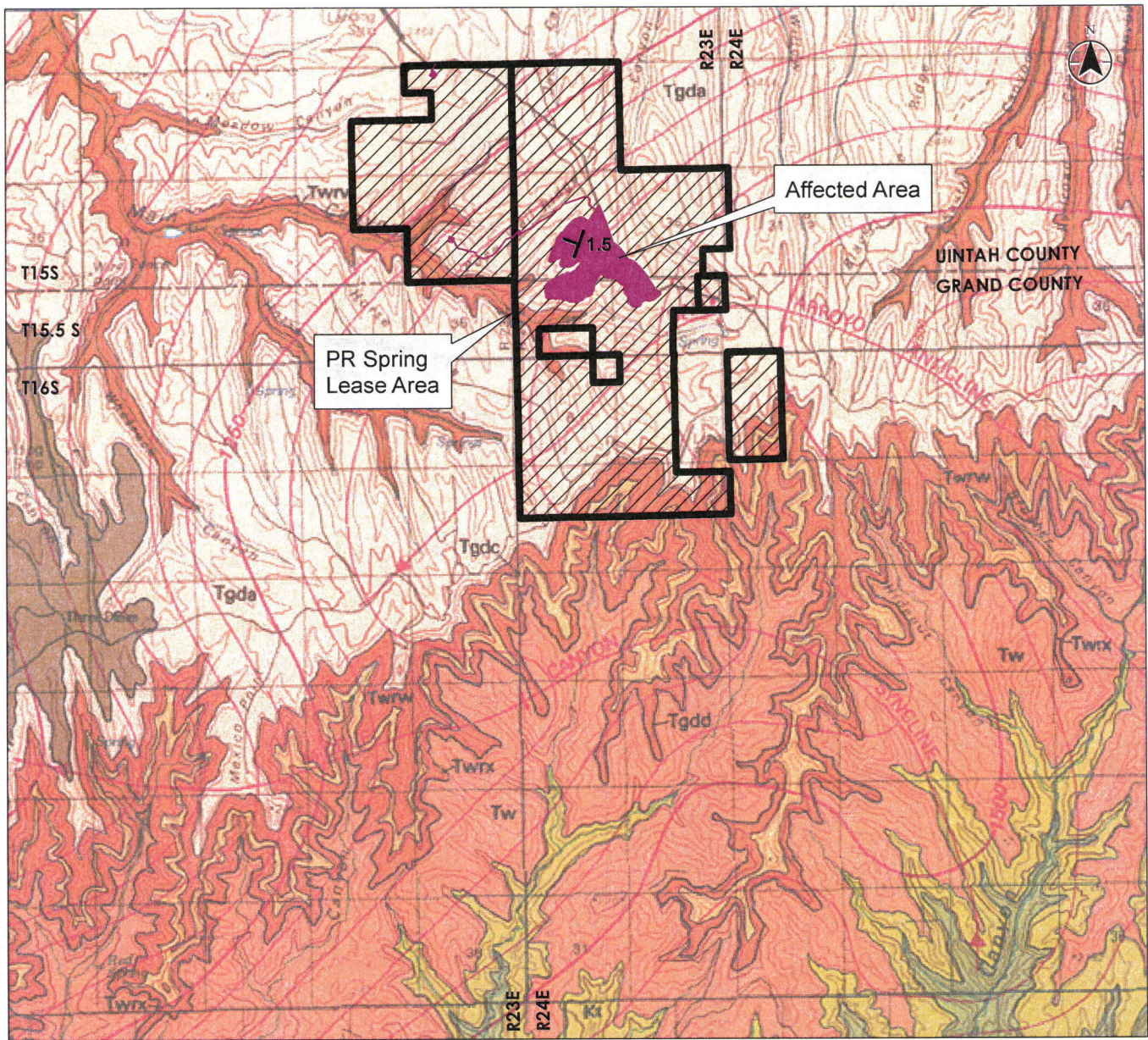
Project Location
Portions of T15S R24E,
T15.5S R24E, and T16S, R24E
Uintah and Grand Co., UT

203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-11-13

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
7
Title
Mine Drainage Control

X:\Users\jstanc\Documents\Projects\PR Spring Mine\Figure 7a Mine Drainage Control.mxd Revised: 2015-01-28 By: jstanc



Description of Map Units

Green River Formation (Eocene)

Tgpl	Parachute Creek Member, lower part
Tgda	Douglas Member
Tgdc	Tongue a
Tgdc	Tongue c

Wasatch Formation (Eocene and Palocene)

Twrw	Unit w of Renegade Tongue
Twrx	Unit x of Renegade Tongue
Tw	Wasatch Formation, main body,

Tuscher Formations (Upper Createous)

Kt	Farrer Formation (Upper Createaceous)
----	---------------------------------------

—	Contact
—	Fault
—	Anticline
—	Syncline
—	Structure Contour
1.5	Strike & Dip

0 4,000 8,000 Feet
1:96,000 (at original document size of 8.5x11)
Contour Interval 50 Meters



Project Location 203714048
Portions of T15S R24E, Prepared by CLP on 2014-10-07
T15.5S R24E, and T16S, R24E Technical Review by KK on 2014-10-10
Uintah and Grand Co., UT Independent Review by LM on 2014-10-30
Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Notes

- Coordinate System: NAD 1927 UTM Zone 12N
- Geology from J. L. Gualtieri, Geologic Map of the Westwater 30x60 Quadrangle Grand and Uintah Counties, Utah, and Garfield and Mesa Counties, Colorado, 1988

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Figure No.


8


Title


Geology Map


Legend

-  Approximate Underground Pipeline Cap
-  Disturbance Limit Boundary Phase 1
-  County Line
-  Gas Lines
-  Roads
-  Topo Contours (2 meters)
-  Pit Boundary
-  Plant
-  Well and Well Access Road
-  Post Mining Reclamation Topography Contours (2 meters)
- Reclamation Treatments**

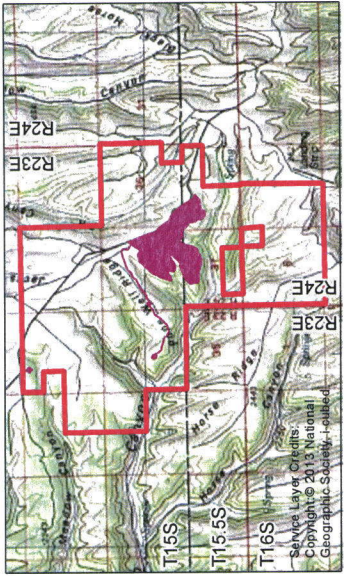
 Area to be graded, ripped, topsoiled, and seeded

 Area to be graded, topsoiled, and seeded

 Man camp area to be ripped, topsoiled, and seeded (off map)

 Area to be seeded

- Notes**
1. Coordinate System: NAD 1927 UTM Zone 12N
 2. Modified from Norwest Corporation, Post Mining Reclamation Topography, 08/04/2014, T:\USOilSands\384-6



203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-11-13

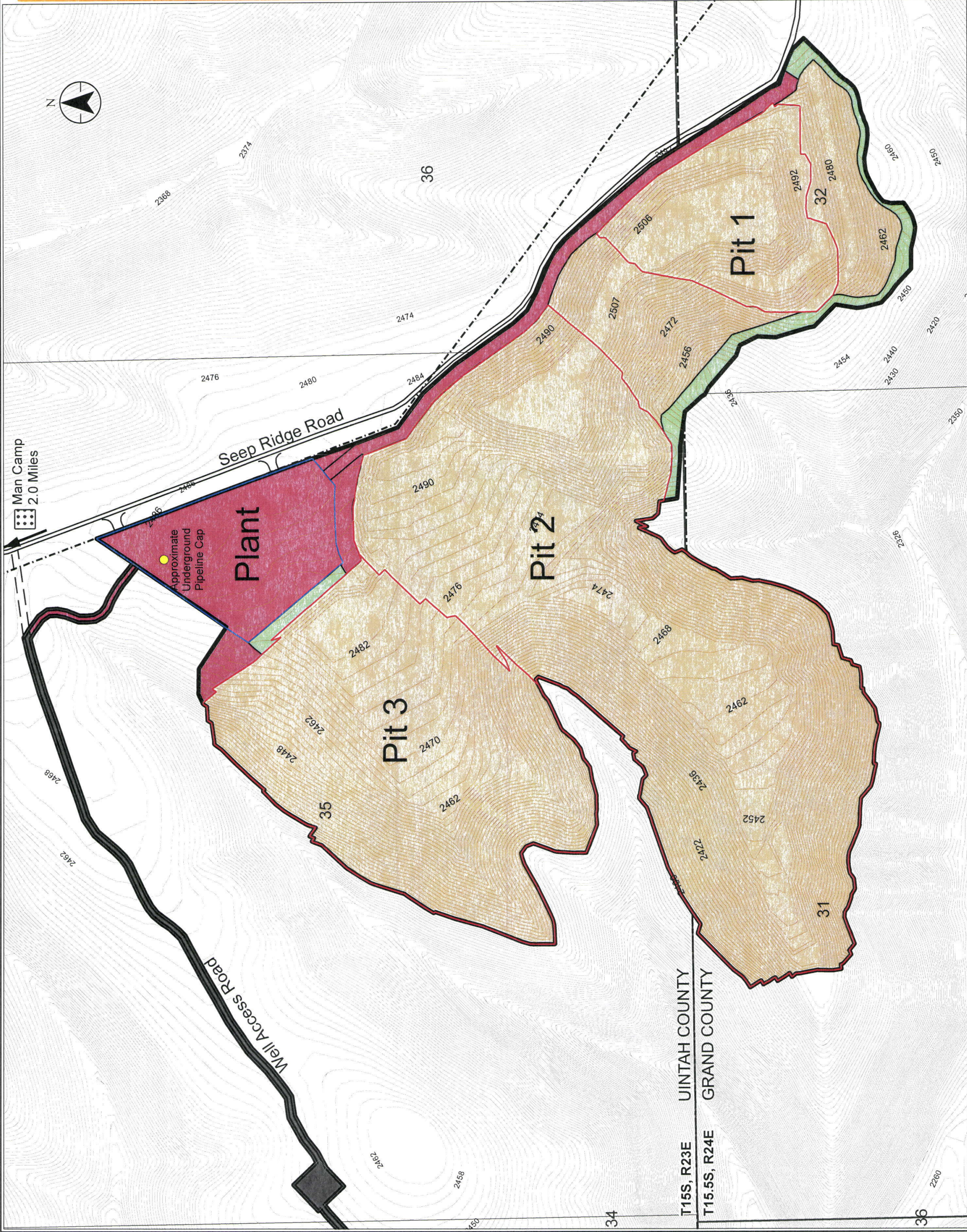
Project Location
Portions of T15S R24E
T15.5S R24E and T16S R24E
Utah and Grand Co., UT

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
11

Title

Reclamation Plan



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Appendix E

Surety Calculation

Year One Reclamation Cost Estimate Summary

US Oil Sands PR Spring Mine
M/047/0090

Revised 2/3/2015

Bonding Calculations

Direct Costs

Subtotal Demolition and Removal	\$83,335.70
Subtotal Backfilling and Grading	\$118,351.49
Subtotal Revegetation	<u>\$68,543.96</u>
Subtotal Direct Costs	\$270,231.15

Indirect Costs

Mob/Demob	\$27,023.00	10.0%
Contingency	\$13,512.00	5.0%
Engineering Redesign	\$6,756.00	2.5%
Main Office Expense	\$18,376.00	6.8%
Project Management Fee	<u>\$6,756.00</u>	2.5%
Subtotal Indirect Costs	\$72,423.00	26.8%

Total Cost 2015 **\$342,654.15**

Number of Years	5
Escalation Factor	0.019
Escalation	\$33,813

Reclamation Cost Escalated	\$376,467
Average Cost per Acre Disturbed	\$1,719

Bond Amount (Rounded to nearest \$1,000)
2020 Dollars

\$376,000

NOTES:

1|Concrete foundations of Sprung Structures and Ore conditioning and handling will be ripped with a dozer and buried in place.

2|Assumes a daily rental of a .75 cy hydraulic excavator. The excavation work should not take this long, but a daily rate was used for rental transportation and logistics

For all estimates, Total Unit cost includes Means Rental (daily cost divided by 12 hr day) and Operating cost of equipment (+10% profit) and Labor cost for equipment operator, medium equipment (2015 standard union labor rates)

NOTES:

- 1 The gravel parking area is approximately 2.6 acres in size, covered with 4 inches of gravel, making 1,396 CY to be disposed. Gravel will be pushed to the cleaned-out water storage pond location to partially fill this void.
- 2 Soil stockpile areas (3.8 acres) will not need to be regraded as the underlying surface has not been disturbed, but will be ripped; the 20.6-acre plant site and haul roads (14.2 acres) will also be ripped. These total 38.6 acres to be ripped to relieve compaction using a Cat 14 grader.
- 3 A highwall safety berm, extending up to 500 linear feet, 4 feet high and 12 feet wide, may be in place on the side of the backfilled pit when reclamation commences. It will be blended into the regraded pit with a D8 dozer.
- 4 Approximately 64,372 cubic yards of topsoil and vegetative debris will be redistributed to about a 5-inch depth with a scraper and dozer assist, over approximately 84 acres of the mine. Average haul is 600 ft. The 3.8 acres of topsoil storage areas will not be topsoiled because they will not be stripped of topsoil.

NOTES: No mulch or fertilizer will be used. All 88 acres affected (95 acres [see NOI Table 2] less approximately 7 unreclaimed acres for well access road) at the mine area will be seeded with a D6 tractor-pulled broadcast seeder. Seed price quote is from Granite Seed; Lehi, Utah; Jan. 2015

Project: PR Spring Mine
Date: 06/03/14
Prepared by: ADS

WORKSHEET 5
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:

Regrading highwall, dump tops, dump slopes, and spreading gravel in process area

Characterization of Dozer Used (type, size, etc.):

Caterpillar D10T with an 17'3" wide "Universal or U" -blade

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):

Operates along contour of dump slopes and on flat surfaces of dump tops and process area; 500-ft average push

Productivity Calculations:

$$\begin{array}{ccccccccc} \text{Operator Adjustment Factor} & \boxed{0.75} & \times & \boxed{1.00} & \times & \boxed{0.83} & \times & \boxed{1.00} & \times & \boxed{1.00} \\ & \text{operator} & & \text{material} & & \text{efficiency} & & \text{grade} & & \text{weight} \\ & \times & \boxed{1.00} & \times & \boxed{1.00} & \times & \boxed{1.00} & = & \boxed{0.62} \\ & & \text{production} & & \text{visibility} & & \text{elevation} & & \end{array}$$

$$\begin{array}{ccccccc} \text{Net Hourly Production} = & \boxed{160} & \text{LCY/hr} & \times & \boxed{0.62} & = & \boxed{100} \\ & \text{normal hourly} & & & \text{operating} & & \text{LCY/hr} \end{array}$$

Hours Required = See 'Earthwork' sheet for total hours required

Data Source(s):

Reference Cat Performance Handbook 43rd edition

Project: PR Spring Mine
 Date: 06/03/14
 Prepared by: ADS

WORKSHEET 11A
 PRODUCTIVITY OF PUSH-PULL OR SELF-LOADING SCRAPER USE

Earthmoving Activity:

Load and haul topsoil to spread in reveg areas. Also load/haul process material to backfill pit.

Characterization of Scraper Used (type, capacity, etc.):

Caterpillar 631G Push-Load Scraper 21 C.Y. (struck) + 31 C.Y. (heaped)

Description of Scraper Use (origin, destination, grade, haul distance, capacity, etc.):

Topsoil stockpiles located throughout the permit boundary to be spread over adjacent areas.

Productivity Calculations:

Cycle Time = $\frac{1.0}{\text{load time}}$ min + $\frac{1.0}{\text{loaded}}$ min + $\frac{0.5}{\text{maneuver and}}$ min + $\frac{1.0}{\text{return trip}}$ min

= $\frac{3.5}{\text{(push-pull is)}}$ min

Hourly Production = $\frac{25.0}{\text{capacity*}}$ LCY x $\frac{60}{\text{min/hr}}$ ÷ $\frac{3.5}{\text{cycle}}$ min x $\frac{0.90}{\text{efficiency}}$

= $\frac{385.7}{\text{(push-pull is)}}$ LCY/hr

Hours Required = See 'Earthwork' sheet for total hours required

* The average of the struck and heaped capacities; use total for two scrapers for push-pull.

Data Source(s):

Reference Cat Performance Handbook 43rd edition

Project: PR Spring Mine
Date: 06/03/14
Prepared by: ADS

WORKSHEET 12
PRODUCTIVITY AND HOURS REQUIRED FOR MOTORGRADER USE

Earthmoving Activity:

The motor grader will be used for ripping hard surfaces such as topsoil stockpile areas, and roads. Also be used to regrade/contour rough areas and roads.

Characterization of Grader Used (type, size capacity, etc.):

Caterpillar 14H Motor Grader, 215 hp, standard operating weight at 40,000 lbs. equipped with ripper.

Description of Grader Route (push distance, grade, effective blade width, operating speed, etc.):

The grader will rip hard surfaces then regrade/contour to match surrounding environment.

Productivity Calculations:

$$\begin{aligned} & \text{Hourly Production} = \frac{8}{\text{average}} \text{ mi/hr} \times \frac{8.4}{\text{effective blade}} \text{ ft} \times \frac{5280}{\text{ft/mi}} \times \frac{1}{\text{ac}} \\ & \div \frac{43560}{\text{ft}^2} \times \frac{0.90}{\text{efficiency}} = \frac{7.3}{\text{ac/hr}} \end{aligned}$$

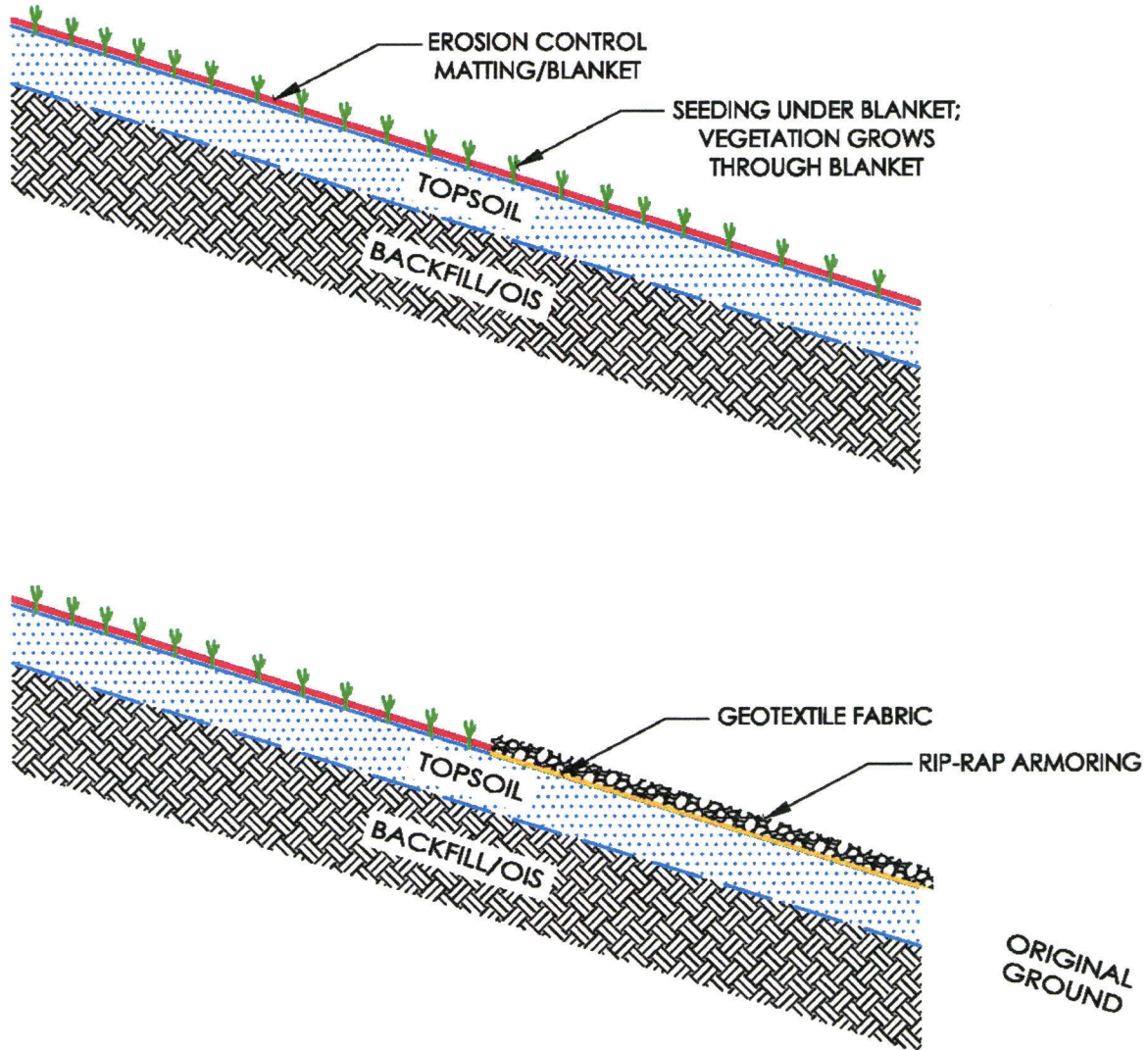
Hours Required = See 'Earthwork' sheet for total hours required

Data Source(s):

Reference Cat Performance Handbook 43rd edition

Appendix G

Storm Water Management Plan



Project Location: Portions of T15S R24E, T15S R24E, and T16S, R24E, Utah and Grand Co., UT
 Prepared by GD on 2015-01-28
 Technical Review by NF on 2015-01-28
 Independent Review by LM on 2015-01-28

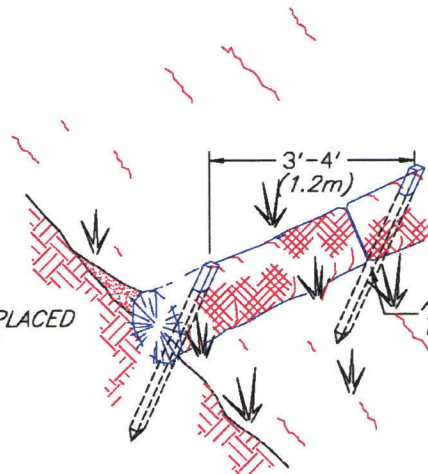
Client/Project: U.S. Oil Sands, (Utah) Inc.
 PR Spring Mine

Figure No. **a**

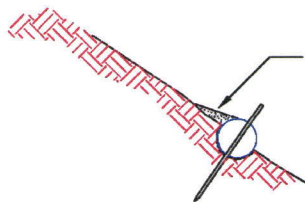
Title: **Erosion Control Structures**

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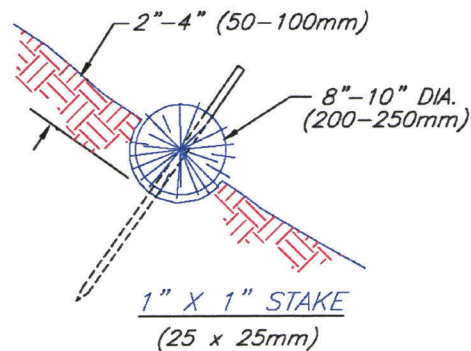
STRAW ROLLS MUST BE PLACED
ALONG SLOPE CONTOURS



ADJACENT ROLLS SHALL
TIGHTLY ABUT



SEDIMENT, ORGANIC MATTER,
AND NATIVE SEEDS ARE
CAPTURED BEHIND THE ROLLS.



NOTE:

1. STRAW ROLL INSTALLATION REQUIRES THE
PLACEMENT AND SECURE STAKING OF THE ROLL IN
A TRENCH, 2'-4' (50-100mm) DEEP, DUG ON
CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN
UNDER OR AROUND ROLL.

Notes

1. Modified from Norwest Corporation, Sediment BMP Detail, 2014-09-18, 384-6

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Project Location: Portions of T155 R24E, T155S R24E, and T16S, R24E, Utah and Grand Co., UT
Prepared by CP on 2015-01-28
Technical Review by NF on 2015-01-28
Independent Review by LM on 2015-01-28

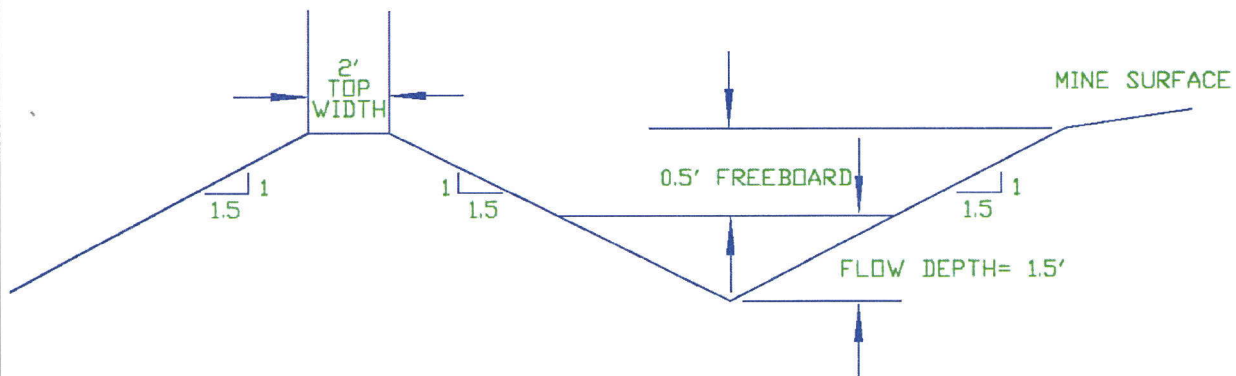
Client/Project: U.S. Oil Sands, (Utah) Inc.,
PR Spring Mine

Figure No.

b

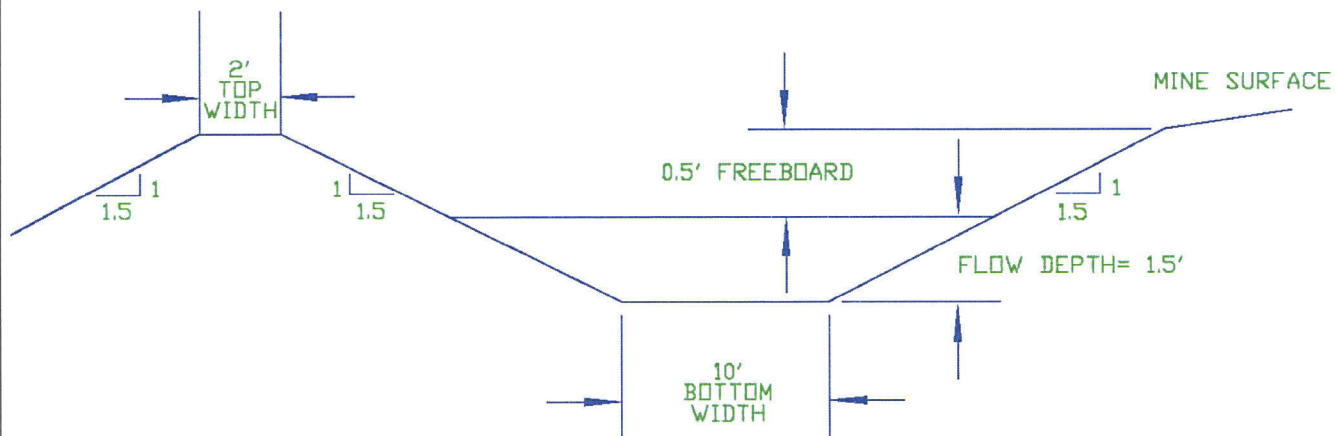
Title

Straw Wattle Detail



TYPICAL TRIANGULAR CHANNEL SECTION

NOT TO SCALE



TYPICAL TRAPEZOIDAL CHANNEL SECTION

NOT TO SCALE

Notes

1. Modified from Norwest Corporation, Diversion Details, 2014-08-28, 384-6

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Project Location: 203714048
 Portions of T15S R24E, T15S R24E, and T16S, R24E Prepared by CP on 2015-01-28
 Utah and Grand Co., UT Technical Review by NF on 2015-01-28
 Independent Review by LM on 2015-01-28

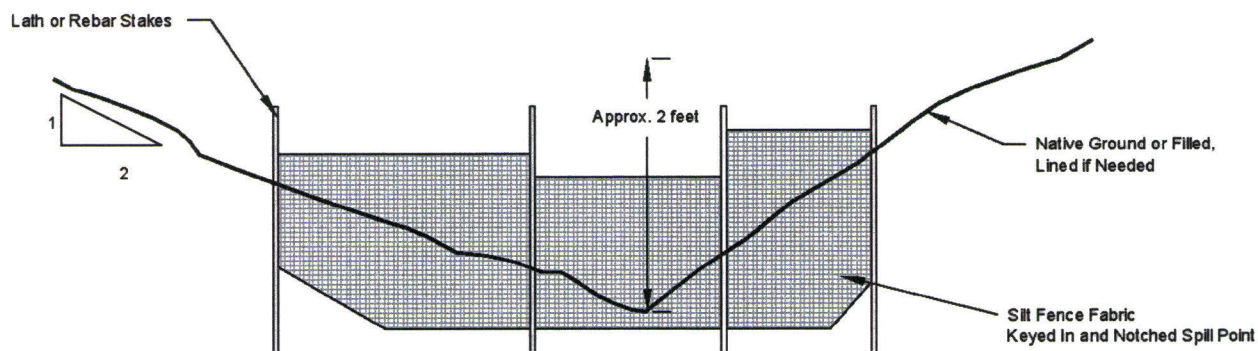
Client/Project:
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 PR Spring Mine

Figure No.

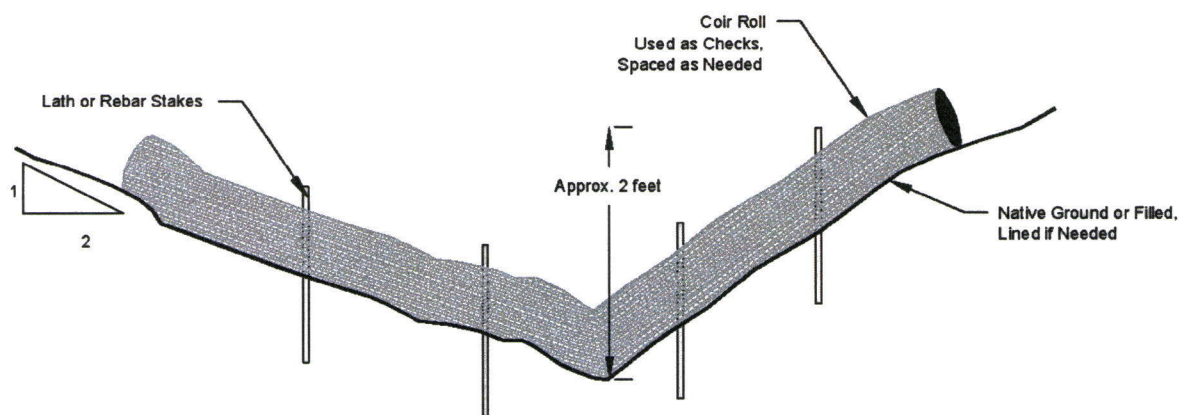
C

Title

Diversion Details



Typical Perimeter Ditch with Silt Fence
Schematic Cross-Section (not to scale)



Typical Perimeter Ditch with Coir Roll
Schematic Cross-Section (not to scale)



Project Location: Portions of T15S R24E, T15S R24E, and T16S R24E, Utah and Grand Co., UT
 Prepared by CP on 2015-01-28
 Technical Review by NF on 2015-01-28
 Independent Review by LM on 2015-01-28

Client/Project:
 U.S. Oil Sands, (Utah) Inc.
 PR Spring Mine

Figure No.
d

Title
Erosion Control Structures

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